Department of Veterans Affairs
VISN 22 Network Logistics Office
4811 Airport Plaza Drive, Suite 600
Long Beach, CA 90822

Final Submittal
Specifications

Contract No. VA-262-P-1115

Project No. 691-13-105WL
"Install Exterior Signage Campus Wide - Phase I"
at the VA Greater Los Angeles Healthcare System
Los Angeles, CA

KAL Architects
12-J Mauchly
Irvine, California 92618

June 4, 2013

DEPARTMENT OF VETERANS AFFAIRS

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SECTION 01 00 00
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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for **"Install Exterior Signage Campus Wide – Phase I" Veterans Administration West Los Angeles Healthcare Center, Los Angeles, California,** as required by drawings and specifications.

B. A pre-bid conference and site visit are scheduled for **January 9, 2014, 11:00 a.m., Building 218, Room 320, Engineering Conference Room.** Interested contractors are highly encouraged to attend the pre-bid conference and site. **No other site visit shall be solicited.**

C. Offices of _____**KAL Architects, Inc.**____, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.

D. Before placement and installation of work subject to tests by testing laboratory retained by Contractor, the Contractor shall notify the Project Engineer in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the Project Engineer.

E. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

F. Prior to commencing work, general contractor shall provide proof that a OSHA certified "competent person" (CP) (29 CFR 1926.20(b) (2) will maintain a presence at the work site whenever the general or subcontractors are present.

G. Training:

1. All employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course for on-site staff and 30 additional hours for project superintendent (competent person) and /or other relevant competency training, as determined by VA COTR with input from the ICRA team.

2. Submit training records of all such employees for approval before the start of work.

H. VHA Directive 2011-36, Safety and Health during Construction, dated 9/22/2011 in its entirety is made a part of this section

1.2 STATEMENT OF BID ITEM(S)

A. ITEM I, GENERAL CONSTRUCTION: Main Bid Work includes general construction, alterations, signage, walks, grading, drainage, removal of existing signage and other items as per attached drawings and specifications for this project.

B. Alternate No. 1 - Includes Main Bid less vehicular directional signs V11, V12, V13, V14, V15, and V16.

C. Alternate No. 2 - Includes main Bid less vehicular directional signs V11, V12, V13, V14, V15, V16 and V4, V18, V3, V10, V11.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. AFTER AWARD OF CONTRACT, __**1**__ sets of specifications and drawings will be furnished.

B. Additional sets of drawings may be made by the Contractor, at Contractor's expense, from reproducible prints furnished by Issuing Office. Such prints shall be returned to the Issuing Office immediately after printing is completed.

1.4 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.

2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

1. General Contractor’s employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.

2. For working outside the “regular hours” as defined in the contract, The General Contractor shall give 3 days notice to the Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.

3. No photography of VA premises is allowed without written permission of the Contracting Officer.

4. VA reserves the right to close down or shut down the project site and order General Contractor’s employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Key Control:

1. The General Contractor shall provide duplicate keys and lock combinations to the Project Engineer for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.

2. The General Contractor shall turn over all permanent lock cylinders to the VA locksmith for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

D. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of “sensitive information”.

2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.

4. Certain documents, sketches, videos or photographs and drawings may be marked “Law Enforcement Sensitive” or “Sensitive Unclassified”. Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.

5. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.

6. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.

7. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".

8. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).

   a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.

   b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

E. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.

2. Separate permits shall be issued for General Contractor and its employees for parking in designated areas only.

1.5 FIRE SAFETY

A. Applicable Publications: Publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

1. American Society for Testing and Materials (ASTM):

   E84-2009 ..... Surface Burning Characteristics of Building Materials

2. National Fire Protection Association (NFPA):

   10-2010..... Standard for Portable Fire Extinguishers

   30-2008..... Flammable and Combustible Liquids Code

   51B-2009 ..... Standard for Fire Prevention During Welding, Cutting and Other Hot Work

70-2011.....National Electrical Code

241-2009.....Standard for Safeguarding Construction, Alteration, and Demolition Operations

3. Occupational Safety and Health Administration (OSHA):

29 CFR 1926 .....Safety and Health Regulations for Construction

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Project Engineer and Facility Safety Officer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Project Engineer that individuals have undergone contractor's safety briefing.

C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.

D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).

E. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Project Engineer and facility Safety Officer.

F. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Project Engineer and facility Safety Officer.

G. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.

H. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.

I. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Project Engineer and facility Safety Officer. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Project Engineer.

J. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Engineer. Obtain permits from facility Safety Officer at least _72_ hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

K. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Project Engineer and facility Safety Officer.

L. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

M. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

N. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

Q. Fines for violations of Fire Safety Requirements.

1. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

2. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

3. Tripping, setting off, of fire alarms and /or flow switches, without proper notification is a violation fineable at the minimum of $2,500 per offense plus expenses.

4. Any false alarms that causes a visit by the fire department is fineable at the minimum of $2,500 per offense plus expenses.

5. Hot Work: The following offenses are a violation fineable at a minimum of $2,500 per offense plus expenses: a) Failure to obtain a hot work permit prior to work, b) Failure to maintain Fire Watch, as required during Hot Work, and c) Failure to remove smoke detector cover after said Hot Work is completed at the end of the work shift for the day, whichever is sooner.

6. Fines for Open Fire Doors: Fire doors at all times shall be kept closed, where required. These doors shall not be left open in any manner; they shall not be propped or tied open. Violations are fineable at no less than $2,500 per violation plus expenses. These fines will be imposed due to contractor's fault, negligence or failure to comply with NFPA codes and VA Policies.

1.6 OPERATIONS AND STORAGE AREAS

A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

(FAR 52.236-10)

D. Working space and space available for storing materials shall be as determined by the Project Engineer.

E. Workmen are subject to rules of Medical Center applicable to their conduct.

F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others.

1. Do not store materials and equipment in other than assigned areas.

2. Provide unobstructed access to Medical Center areas required to remain in operation.

3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.

G. Phasing: To insure such executions, Contractor shall furnish the Project Engineer with a schedule of approximate/ phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the Project Engineer two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to Project Engineer and Contractor, as indicated on the drawings.

H. Building(s) will be occupied during performance of work; but immediate areas of alterations will be vacated.

1. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

2. Immediate areas of alterations not mentioned in preceding Subparagraph 1 will be temporarily vacated while alterations are performed.

I. Construction Fence: Before construction operations begin, Contractor shall provide a chain link construction fence, 2.1m (seven feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 375mm (15 inches). Bottom of fences shall extend to 25mm (one inch) above grade. Remove the fence when directed by Project Engineer.

J. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Project Engineer.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Project Engineer. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director’s prior knowledge and written approval.

2. Contractor shall submit a request to interrupt any such services to Project Engineer, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.

3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.

4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the Project Engineer.

5. In case of a contract construction emergency, service will be interrupted on approval of Project Engineer. Such approval will be confirmed in writing as soon as practical.

6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.

L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

M. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.

2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the Project Engineer.

N. Coordinate the work for this contract with other construction operations as directed by Project Engineer. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.

1.7 ALTERATIONS

A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Project Engineer and a representative of VA Supply Service, of areas around buildings where signage alterations occur and areas which are anticipated routes of access, and furnish a report, signed by all three, to the Contracting Officer. This report shall list by Buildings and parking lots:

1. Existing condition of surfaces not required to be altered throughout the affected areas of site.

2. Existence and conditions of items such as light fixtures and accessories, equipment, etc., required by drawings to be either reused or relocated, or both.

3. Shall note any discrepancies between drawings and existing conditions at site.

4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and Project Engineer.

B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Project Engineer and/or Supply Representative, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).

C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and Project Engineer together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:

1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.

D. Protection: Provide the following protective measures:

1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.

2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.

3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.8 DISPOSAL AND RETENTION

A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:

1. Reserved items which are to remain property of the Government are identified by attached tags as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Project Engineer.

2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.

3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(FAR 52.236-9)

C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

D. Refer to FAR clause 52.236-7, "Permits and Responsibilities," which is included in General Conditions. A National Pollutant Discharge Elimination System (NPDES) permit is required for this project. The Contractor is considered an "operator" under the permit and has extensive responsibility for compliance with permit requirements. VA will make the permit application available at the (appropriate medical center) office. The apparent low bidder, contractor and affected subcontractors shall furnish all information and certifications that are required to comply with the permit process and permit requirements. Many of the permit requirements will be satisfied by completing construction as shown and specified. Some requirements involve the Contractor's method of operations and operations planning and the Contractor is responsible for employing best management practices. The affected activities often include, but are not limited to the following:

- Designating areas for equipment maintenance and repair;
- Providing waste receptacles at convenient locations and provide regular collection of wastes;
- Locating equipment wash down areas on site, and provide appropriate control of wash-waters;
- Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
- Providing adequately maintained sanitary facilities.

1.10 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Project Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Project Engineer before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.

C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.

D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.11 PHYSICAL DATA

A. Contractor to submit soil’s physical data for review.

B. Subsurface conditions shall be developed by utilizing a minimum of 5 borings 15 feet deep and test pits.

C. Five copies of the soil report shall be made available for review and comment.

(FAR 52.236-4)

1.12 PROFESSIONAL SURVEYING SERVICES

A. A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor shall perform services specified herein and in other specification sections. The Contractor shall certify that the land surveyor or civil engineer is not one who is a regular employee of the Contractor, and that the land surveyor or civil engineer has no financial interest in this contract.

1.13 LAYOUT OF WORK

A. The Contractor shall lay out the work from Government established base lines and bench marks, indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates,

platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(FAR 52.236-17)

B. Establish and plainly mark lines for each exterior sign, and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each such exterior sign, are in accordance with control grades shown on contract drawings.

C. Following completion of general excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of signage footings, in both directions, major utilities and elevations:

1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the Project Engineer before any work (such as footings, utilities and other major controlling features) is placed.

1.14 AS-BUILT DRAWINGS

A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.

B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Project Engineer's review, as often as requested.

C. Contractor shall deliver two approved completed sets of as-built drawings to the Project Engineer within 15 calendar days after each completed phase and after the acceptance of the project by the Project Engineer.

D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.15 USE OF ROADWAYS

A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the Project Engineer, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

B. When new permanent roads are to be a part of this contract, Contractor may construct them immediately for use to facilitate building operations. These roads may be used by all who have business thereon within zone of building operations.

C. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads leading thereto must be completed and available for use at time set for completion of such buildings or parts thereof.

1.16 TEMPORARY TOILETS

A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by Project Engineer, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1.17 AVAILABILITY AND USE OF UTILITY SERVICES

A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.

B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

C. Contractor shall install meters at Contractor's expense and furnish the Medical Center a monthly record of the Contractor's usage of electricity as hereinafter specified.

D. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:

1. Obtain heat by connecting to Medical Center heating distribution system.

a. Steam is available at no cost to Contractor.

E. Electricity (for Construction and Testing): Furnish all temporary electric services.

1. Obtain electricity by connecting to the Medical Center electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

F. Water (for Construction and Testing): Furnish temporary water service.

1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection. Water is available at no cost to the Contractor.

2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at Project Engineer's discretion) of use of water from Medical Center's system.

G. Steam: Furnish steam system for testing required in various sections of specifications.

1. Obtain steam for testing by connecting to the Medical Center steam distribution system. Steam is available at no cost to the Contractor.

2. Maintain connections, pipe, fittings and fixtures and conserve steam-use so none is wasted. Failure to stop leakage or other waste will be cause for revocation (at Project Engineer's discretion), of use of steam from the Medical Center's system.

H. Fuel: Natural and LP gas and burner fuel oil required for boiler cleaning, normal initial boiler-burner setup and adjusting, and for performing the specified boiler tests will be furnished by

the Government. Fuel required for prolonged boiler-burner setup, adjustments, or modifications due to improper design or operation of boiler, burner, or control devices shall be furnished by the Contractor at Contractor's expense.

1.18 TESTS

A. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

1.19 INSTRUCTIONS

A. Contractor shall furnish Maintenance and Operating manuals and verbal instructions when required by the various sections of the specifications and as hereinafter specified.

B. Manuals: Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the Project Engineer coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All

instruction periods shall be at such times as scheduled by the Project Engineer and shall be considered concluded only when the Project Engineer is satisfied in regard to complete and thorough coverage. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Project Engineer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.20 RELOCATED ITEMS

A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing items indicated by symbol "R" or otherwise shown to be relocated by the Contractor.

B. Perform relocation of such equipment or items at such times and in such a manner as directed by the Project Engineer.

C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".

D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.

1.21 PHOTOGRAPHIC DOCUMENTATION

A. During the construction period through completion, provide 150 to 200 photographic documentation of construction progress and at selected milestones including electronic indexing, navigation, storage and remote access to the documentation, as per these specifications.

B. Photographic documentation elements:

1. Each digital image shall be taken with a professional grade camera with minimum size of 6 megapixels (MP) capable of producing 200x250mm (8 x 10 inch) prints with a minimum of 2272 x 1704 pixels and 400x500mm (16 x 20 inch) prints with a minimum 2592 x 1944 pixels.

2. Indexing and navigation system shall utilize actual AUTOCAD construction drawings, making such drawings interactive on an on-line interface. For all documentation referenced herein, indexing and navigation must be organized by both time (date-stamped) and location throughout the project.

3. Documentation shall combine indexing and navigation system with inspection-grade digital photography designed to capture actual conditions throughout construction and at critical milestones. Documentation shall be accessible on-line through use of an internet connection. Documentation shall allow for secure multiple-user access, simultaneously, on-line.

4. Before construction signage and adjacent structures surrounding the exterior sign and site shall be documented.

5. Construction progress for all trades shall be tracked at pre-determined intervals, but not less than once every fourteen (14) calendar days (“Progressions”).

6. As-built condition of site utilities shall be documented prior to pouring concrete and/or backfilling.

7. Miscellaneous events that occur during any Contractor site visit, or events captured by the Department of Veterans Affairs independently, shall be dated, labeled and inserted into a Section in the navigation structure entitled “Slideshows,” allowing this information to be stored in the same “place” as the formal scope.

D. Coordination of photo shoots is accomplished through Project Engineer. Contractor shall also attend construction team meetings as necessary. Contractor’s operations team shall provide regular updates regarding the status of the documentation, including photo shoots concluded, the availability of new Progressions or Exact-Builts viewable on-line and anticipated future shoot dates.

G. Upon completion of the project, final copies of the documentation (the “Permanent Record”) with the indexing and navigation system embedded (and active) shall be provided in an electronic media format, typically a DVD or external hard-drive.

1.22 FINAL DIGITAL IMAGES

A. A minimum of two (2) images of each sign shall be taken with a minimum 6 MP camera, by a professional photographer with different settings to allow the Project Engineer to select the image to be printed. All images are provided to the Project Engineer on a CD.

B. Photographs shall be taken upon completion, including landscaping. They shall be taken on a clear sunny day to obtain sufficient detail to show depth and to provide clear, sharp pictures.

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SECTION 01 32 16.15
PROJECT SCHEDULES
(SMALL PROJECTS – DESIGN/BID/BUILD)

PART 1- GENERAL

1.1 DESCRIPTION:

A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

1.2 CONTRACTOR'S REPRESENTATIVE:

A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COTR).

B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.

C. The Contractor’s representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

A. The Contractor shall submit a qualification proposal to the COTR, within 10 days of bid acceptance. The qualification proposal shall include:

1. The name and address of the proposed consultant.
2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.

B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly

computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COTR shall identify the five different report formats that the contractor shall provide.

B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.

C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. **The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their

requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

D. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
   1. Notify the Contractor concerning his actions, opinions, and objections.
   2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.

E. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

F. The Complete Project Schedule shall contain approximately ___50___work activities/events.

1.6 WORK ACTIVITY/EVENT COST DATA

A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.

B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).

C. In accordance with FAR 52.236 – 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 – 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.

D. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 PROJECT SCHEDULE REQUIREMENTS

A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
   1. Show activities/events as:
      a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
      b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
      c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
      d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
      e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
   2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
   3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
   4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
   5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.

B. The Contractor shall submit the following supporting data in addition to the project schedule:
   1. The appropriate project calendar including working days and holidays.
   2. The planned number of shifts per day.
   3. The number of hours per shift.

Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.

C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COTR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COTR's approval of the Project Schedule.

D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.9 PAYMENT AND PROGRESS REPORTING

A. Monthly schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:

1. Actual start and/or finish dates for updated/completed activities/events.
2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
5. Completion percentage for all completed and partially completed activities/events.
6. Logic and duration revisions required by this section of the specifications.
7. Activity/event duration and percent complete shall be updated independently.

B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.

C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and Project engineer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the Project engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the Project engineer within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**

D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.10 RESPONSIBILITY FOR COMPLETION

A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:

1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.

2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
3. Reschedule the work in conformance with the specification requirements.

B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
3. The schedule does not represent the actual prosecution and progress of the project.
4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.

B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.

C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.

D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 – 4 (Changes) and VAAR 852.236 – 88 (Changes – Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.

E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a

justification, CPM data and supporting evidence as the COTR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

B. Actual delays in activities/events which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.

C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 – 4 (Changes) and VAAR 852.236 – 88 (Changes – Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.

D. All delays due to non-work activities/events such as RFI’s, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

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SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.

1-2. For the purposes of this contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:

A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.

1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.

1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Project Engineer on behalf of the Contracting Officer.

1-6. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.

1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and

Architect- Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.

1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.

A. Submit samples required in quadruplicate. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.

B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
   1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
   2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
   3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.

D. Approved samples will be kept on file by the Project Engineer at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

E. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
   1. For each drawing required, submit one legible photographic paper or vellum reproducible.
   2. Reproducible shall be full size.

3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.

1-12. Samples for approval shall be sent to Architect-Engineer, in care of Project Engineer, VA Medical Center,

_____

(P.O. Address)

_____

(City, State and Zip Code)

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SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)

A. The specifications and standards cited in this solicitation can be examined at the following location:

DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
425 Eye Street N.W, (sixth floor)
Washington, DC 20001
Telephone Numbers: (202) 632-5249 or (202) 632-5178
Between 9:00 AM - 3:00 PM

1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

A. The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AA Aluminum Association Inc.
http://www.aluminum.org

AAMA American Architectural Manufacturer's Association
http://www.aamanet.org

AAN	American Nursery and Landscape Association http://www.anla.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
AGA	American Gas Association http://www.aga.org
AGC	Associated General Contractors of America http://www.agc.org
AISC	American Institute of Steel Construction http://www.aisc.org
AISI	American Iron and Steel Institute http://www.steel.org
AITC	American Institute of Timber Construction http://www.aitc-glulam.org
ANLA	American Nursery & Landscape Association http://www.anla.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ASAE	American Society of Agricultural Engineers http://www.asae.org
ASCE	American Society of Civil Engineers http://www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering http://www.asse-plumbing.org

ASTM	American Society for Testing and Materials http://www.astm.org
AWI	Architectural Woodwork Institute http://www.awinet.org
AWS	American Welding Society http://www.aws.org
AWWA	American Water Works Association http://www.awwa.org
CISPI	Cast Iron Soil Pipe Institute http://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute http://www.chainlinkinfo.org
CPMB	Concrete Plant Manufacturers Bureau http://www.cpmb.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute http://www.crsi.org
EPA	Environmental Protection Agency http://www.epa.gov
ETL	ETL Testing Laboratories, Inc. http://www.et1.com
FPS	The Forest Products Society http://www.forestprod.org
FM	Factory Mutual Insurance http://www.fmglobal.com
GSA	General Services Administration http://www.gsa.gov
HPVA	Hardwood Plywood & Veneer Association http://www.hpva.org
ICBO	International Conference of Building Officials http://www.icbo.org
ICEA	Insulated Cable Engineers Association Inc. http://www.icea.net
IEEE	Institute of Electrical and Electronics Engineers http://www.ieee.org\
NBMA	Metal Buildings Manufacturers Association http://www.mbma.com

NAAMM	National Association of Architectural Metal Manufacturers http://www.naamm.org
NFPA	National Fire Protection Association http://www.nfpa.org
NHLA	National Hardwood Lumber Association http://www.natlhardwood.org
NIH	National Institute of Health http://www.nih.gov
NIST	National Institute of Standards and Technology http://www.nist.gov
NLMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org
NPA	National Particleboard Association 18928 Premiere Court Gaithersburg, MD 20879 (301) 670-0604
NSF	National Sanitation Foundation http://www.nsf.org
OSHA	Occupational Safety and Health Administration Department of Labor http://www.osha.gov
PCA	Portland Cement Association http://www.portcement.org
PPI	The Plastic Pipe Institute http://www.plasticpipe.org
RMA	Rubber Manufacturers Association, Inc. http://www.rma.org
SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. http://www.smacna.org
SSPC	The Society for Protective Coatings http://www.sspc.org
UBC	The Uniform Building Code See ICBO
UL	Underwriters' Laboratories Incorporated http://www.ul.com

ULC	Underwriters' Laboratories of Canada http://www.ulc.ca
WCLIB	West Coast Lumber Inspection Bureau 6980 SW Varns Road, P.O. Box 23145 Portland, OR 97223 (503) 639-0651
WRCLA	Western Red Cedar Lumber Association P.O. Box 120786 New Brighton, MN 55112 (612) 633-4334
WWPA	Western Wood Products Association http://www.wwpa.org

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by Department of Veterans.

1.2 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Association of State Highway and Transportation Officials (AASHTO):

T27-11	Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
T96-02 (R2006)	Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
T99-10	Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
T104-99 (R2007)	Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
T180-10	Standard Method of Test for Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
T191-02(R2006)	Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method

C. American Society for Testing and Materials (ASTM):

C136-06	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
C1077-11c	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
D422-63(2007)	Standard Test Method for Particle-Size Analysis of Soils
D698-07e1	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
D1140-00(2006)	Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve
D1143/D1143M-07e1	Standard Test Methods for Deep Foundations Under Static Axial Compressive Load

D1188-07e1.....Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

D1556-07.....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D1557-09.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft3 (2,700 KNm/m3))

D2167-08) .....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

D2974-07a.....Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

D3666-11.....Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D3740-11.....Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction

D6938-10.....Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E329-11c .....Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

E543-09.....Standard Specification for Agencies Performing Non-Destructive Testing

E709-08.....Standard Guide for Magnetic Particle Examination

1.3 REQUIREMENTS:

A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Project Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Project Engineer to such failure.

C. Written Reports: Testing laboratory shall submit test reports to Project Engineer, Contractor, unless other arrangements are agreed to in writing by the Project Engineer. Submit reports of tests that fail to meet construction contract requirements on colored paper.

D. Verbal Reports: Give verbal notification to Project Engineer immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:

1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Project Engineer regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Project Engineer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
2. Provide part time observation of compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.
3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with AASHTO, T99/T180, Method A, ASTM D698, D1557 Method A ,ASTM D698 and/or ASTM D1557.
2. Make field density tests in accordance with the primary testing method following ASTM D6938 or AASHTO T238 wherever possible. Field density tests utilizing ASTM D1556, AASHTO T191, or ASTM D2167 shall be utilized on a case by case basis only if there are problems with the validity of the results from the primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the Project Engineer before the tests are conducted.
   a. Pavement Subgrade: One test for each 335 m^2 (400 square yards), but in no case fewer than two tests.
   b. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
   c. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.

C. Fill and Backfill Material Gradation: Gradation of fill and backfill material shall be determined in accordance with ASTM C136, ASTM D422 or ASTM D1140.

d. Testing Materials: Test suitability of on-site and off-site borrow as directed by Project Engineer.

3.2 LANDSCAPING:

A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.
   1. Test for organic material by using ASTM D2974.
   2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.

B. Submit laboratory test report of topsoil to Project Engineer.

3.3 ASPHALT CONCRETE PAVING:

A. Aggregate Base Course:
   1. Determine maximum density and optimum moisture content for aggregate base material in accordance with AASHTO T180, Method D or ASTM D1557, Method D.
   2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with AASHTO T191 or ASTM D1556.
   3. Sample and test aggregate as necessary to insure compliance with specification requirements for gradation, wear, and soundness as specified in the applicable state highway standards and specifications.

B. Asphalt Concrete:
   1. Aggregate: Sample and test aggregates in stock pile and hot-bins as necessary to insure compliance with specification requirements for gradation (AASHTO T27), wear (AASHTO T96), and soundness (AASHTO T104).
   2. Temperature: Check temperature of each load of asphalt concrete at mixing plant and at site of paving operation.
   3. Density: Make a minimum of two field density tests in accordance with ASTM D1188 of asphalt base and surface course for each day's paving operation.

3.4 TYPE OF TEST:

	Approximate Number of Tests Required
A. Earthwork:	
Laboratory Compaction Test, Soils:	
(AASHTO T180), (AASHTO T99) (ASTM D1557) or ASTM D698)	**8**
Field Density, Soils (AASHTO T191, T205, or T238)	**8**
Penetration Test, Soils	**8**
B. Landscaping:	
Topsoil Test	**4**

C. Aggregate Base:

Laboratory Compaction, (AASHTO T180) or (ASTM D1557)	**8**
Field Density,(AASHTO T191) (ASTM D1556)	**8**
Aggregate, Base Course Gradation (AASHTO T27)	**8**
Wear (AASHTO T96)	**8**
Soundness (AASHTO T104)	**8**

D. Asphalt Concrete:

Field Density, (AASHTO T230)//ASTM D1188//	**8**
Aggregate, Asphalt Concrete Gradation (AASHTO T27)	**8**
Wear (AASHTO T96)	**8**
Soundness (AASHTO T104)	**8**

E. Inspection:

Technical Personnel (Man-days)	**15**

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.

B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
   1. Adversely effect human health or welfare,
   2. Unfavorably alter ecological balances of importance to human life,
   3. Effect other species of importance to humankind, or;
   4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

C. Definitions of Pollutants:
   1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
   2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
   3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
   4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
   5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.
   6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
   7. Sanitary Wastes:
      a. Sewage: Domestic sanitary sewage and human and animal waste.
      b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 QUALITY CONTROL

A. Establish and maintain quality control for the environmental protection of all items set forth herein.

B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. U.S. National Archives and Records Administration (NARA):

33 CFR 328.....Definitions

1.4 SUBMITTALS

A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:

1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the Project Engineer to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the Project Engineer // and the Contracting Officer // for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
    a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
    b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
    c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
    d. Description of the Contractor's environmental protection personnel training program.
    e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
    f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
    g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
    h. Permits, licenses, and the location of the solid waste disposal area.
    i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, // stream crossings, // material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan

approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.

j. Environmental Monitoring Plans for the job site including land, water, air, and noise.

k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.

B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Project Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.

2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.

   a. Box and protect from damage existing trees and shrubs to remain on the construction site.

   b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.

   c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.

3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.

4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
    a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local 100 (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
    b. Reuse or conserve the collected topsoil sediment as directed by the Project Engineer. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
    c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
6. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
7. Manage and control spoil areas on Government property to limit spoil to areas and prevent erosion of soil or sediment from entering nearby water courses or lakes.
8. Protect adjacent areas from despoilment by temporary excavations and embankments.
9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
11. Handle discarded materials other than those included in the solid waste category as directed by the Project Engineer.

C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
    1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.

2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
3. Monitor water areas affected by construction.

D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.

E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of // insert Name of State and title of State Air Pollution Statue, Rule, or Regulation // and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.

1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.

F. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Project Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified.

1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00p.m unless otherwise permitted by local ordinance or the Project Engineer. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
   a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75	BLASTING	//--//
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

   b. Use shields or other physical barriers to restrict noise transmission.
   c. Provide soundproof housings or enclosures for noise-producing machinery.
   d. Use efficient silencers on equipment air intakes.
   e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
   f. Line hoppers and storage bins with sound deadening material.
   g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the Project Engineer noting any problems and the alternatives for mitigating actions.

G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to

the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.

H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Project Engineer. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.

B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.

C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:

1. Waste Management Plan development and implementation.
2. Techniques to minimize waste generation.
3. Sorting and separating of waste materials.
4. Salvage of existing materials and items for reuse or resale.
5. Recycling of materials that cannot be reused or sold.

D. At a minimum the following waste categories shall be diverted from landfills:

1. Soil.
2. Inerts (eg, concrete, masonry and asphalt).
3. Clean dimensional wood and palette wood.
4. Green waste (biodegradable landscaping materials).
5. Engineered wood products (plywood, particle board and I-joists, etc).
6. Metal products (eg, steel, wire, beverage containers, copper, etc).
7. Cardboard, paper and packaging.
8. Bitumen roofing materials.
9. Plastics (eg, ABS, PVC).
10. Carpet and/or pad.
11. Gypsum board.
12. Insulation.
13. Paint.
14. Fluorescent lamps.

1.2 RELATED WORK

A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
   1. Excess or unusable construction materials.
   2. Packaging used for construction products.
   3. Poor planning and/or layout.
   4. Construction error.
   5. Over ordering.
   6. Weather damage.
   7. Contamination.
   8. Mishandling.
   9. Breakage.

B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.

C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.

D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.

E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website http://www.cwm.wbdg.org provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.

F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.

H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.

B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.
I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
    1. On-site Recycling – Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
    2. Off-site Recycling – Materials hauled to a location and used in an altered form in the manufacture of new products.
M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
O. Return: To give back reusable items or unused products to vendors for credit.
P. Salvage: To remove waste materials from the site for resale or re-use by a third party.

Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.

R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.

S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:

B. Prepare and submit to the Resident Engineer a written demolition debris management plan. The plan shall include, but not be limited to, the following information:

1. Procedures to be used for debris management.
2. Techniques to be used to minimize waste generation.
3. Analysis of the estimated job site waste to be generated:
    a. List of each material and quantity to be salvaged, reused, recycled.
    b. List of each material and quantity proposed to be taken to a landfill.
4. Detailed description of the Means/Methods to be used for material handling.
    a. On site: Material separation, storage, protection where applicable.
    b. Off site: Transportation means and destination. Include list of materials.
        1) Description of materials to be site-separated and self-hauled to designated facilities.
        2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
    c. The names and locations of mixed debris reuse and recycling facilities or sites.
    d. The names and locations of trash disposal landfill facilities or sites.
    e. Documentation that the facilities or sites are approved to receive the materials.

C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 APPLICABLE PUBLICATIONS

A Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.

B. U.S. Green Building Council (USGBC):
LEED Green Building Rating System for New Construction

1.7 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

PART 2 - PRODUCTS

2.1 MATERIALS

A. List of each material and quantity to be salvaged, recycled, reused.
B. List of each material and quantity proposed to be taken to a landfill.
C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.
B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.
C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL

A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT

A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.
B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

- - - E N D - - -

Sonoco
1 North Second Street
Hartsville, South Carolina 29550
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Website www.sonotube.com
E-mail terry.mckeon@sonoco.com

Product Guide Specification

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format. The section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings.

Delete all "Specifier Notes" when editing this section.

SECTION 03 10 50

ROUND CONCRETE COLUMN FORMS

Specifier Notes: This section covers Sonoco Sonotube® Concrete Forms. Consult Sonoco for assistance in editing this section for the specific application.

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Round cast-in-place concrete column forms.

1.2 RELATED SECTIONS

Specifier Notes: Edit the following list of related sections as required for the project. List other sections with work directly related to this section.

A. Section 03 30 530 - CAST-IN-PLACE CONCRETE (SHORT FORM).

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1.3 REFERENCES

~~Specifier Notes: List standards referenced in this section, complete with designations and titles. This article does not require compliance with standards, but is merely a listing of those used.~~

A. ACI 301 - Standard Specification for Structural Concrete.

1.4 SUBMITTALS

A. Comply with Section ~~01330~~ 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES~~ Submittal Procedures~~.

B. Product Data: Submit manufacturer's product data, including erection and removal instructions.

~~Specifier Notes: Edit the following sentence to specify shop drawings. Delete if shop drawings are not required for formwork.~~

~~C. Shop Drawings: Submit manufacturer's shop drawings, indicating locations and dimensions of embedded items.~~

1.5 QUALITY ASSURANCE

A. Column Formwork and Form Accessories: ACI 301, unless otherwise specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site with labels clearly identifying product name and manufacturer.

B. Storage:

1. Store forms in accordance with manufacturer's instructions.
2. Store forms vertically in dry area if at all possible.
3. If forms stored horizontally, elevate above ground on supports running length of forms. Uniform support is required to keep forms from warping.
4. Protect forms from rain and excess moisture.
5. Do not dent, scratch, or damage interior coating.

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6. Do not drop forms.

C. Handling: Protect forms during handling and erection to prevent damage.

PART 2- PRODUCTS

2.1 MANUFACTURER

2.1

A. Basis of Design product: "Sonotube," as manufactured by A. Sonoco
Products of other manufacturers satisfying the requirements of this specification shall be acceptable.

1.

2.2 ROUND CONCRETE COLUMN FORMS

A. Concrete Column Forms: Sonotube Concrete Forms.

1. Description: Multiple layers of 100 percent recycled paperboard, spirally wound, and laminated with adhesive.
2. Interior Surface: Smooth with spiral seam. Moisture barrier plastic coating.
3. Exterior Surface:
   a. Sonotube RainGuard – 100 percent recycled paper,
   b. Sonotube Commercial - Moisture Barrier outer label.
4. Forms will impart visible spiral mark on concrete columns.
5. 1-piece, 1-time-use forms.
6. Recyclable.
7. Inside Diameter: As indicated on the Drawings.

PART 3- EXECUTION

3.1 EXAMINATION

A. Examine areas to receive column forms. Notify Architect if areas are not acceptable. Do not begin erection until unacceptable conditions have been corrected.

3.2 ERECTION

A. Place and brace column forms in accordance with manufacturer's instructions. At a minimum, forms must be secured at the base and at the top of the form. Additional mid-point bracing may be required for column heights in excess of 12 feet

B. Erect forms at locations and to elevations as indicated on the Drawings.

C. Erect column forms plumb. Bracing must be adequate to maintain plumb of column form throughout pouring and curing of concrete.

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D. Avoid damaging interior surface of forms.

E. Waterproof and reinforce openings cut into forms.

F. Do not use forms that are out-of-round, deformed, damaged, or contain defects that could impair concrete surface.

G. Protect forms from rain and snow if work is delayed and forms have been positioned for placing concrete.

H. Place waterproof sheeting over top of forms to prevent damage to interior surface by rain or snow.

I. Do not allow forms to stand in water or snow before placing concrete.

3.3 PLACING CONCRETE

A. Place concrete as specified in Section 03 30 53, CAST-IN-PLACE CONCRETE (SHORT FORM), unless otherwise specified in this section.

B. Do not place concrete if column forms are wet.

C. Apply form release coating to interior surface.

D. Place concrete at pour rate in accordance with manufacturer's instructions. Sonotube RainGuard is sold in standard lengths of 12 feet. Sonotube Commercial is sold in standard lengths of 20 feet. Either form can be poured to this full height without pour rate restrictions, as indicated on product label. For lengths in excess of these standards, call for instructions.

E. Do not touch interior surface of forms with vibrator.

F. Do not vibrate concrete from exterior of forms.

~~Specifier Notes: Specify inside diameter of forms. Sonotube Concrete Forms are available with inside diameters from 6 to 60 inches.~~

~~7.Inside Diameter: [_____ inches] [As indicated on the Drawings].~~

~~**PART 3EXECUTION**~~

~~**3.1 EXAMINATION**~~

~~A. Examine areas to receive column forms. Notify Architect if areas are not acceptable. Do not begin erection until unacceptable conditions have been corrected.~~

~~**3.2 ERECTION**~~

~~A. Place and brace column forms in accordance with manufacturer's instructions. At a minimum, forms must be secured at the base and at the top of the form. Additional mid-point bracing may be required for column heights in excess of 12 feet~~

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B. Erect forms at locations and to elevations as indicated on the Drawings.

C. Erect column forms plumb. Bracing must be adequate to maintain plumb of column form throughout pouring and curing of concrete.

D. Avoid damaging interior surface of forms.

E. Waterproof and reinforce openings cut into forms.

F. Do not use forms that are out-of-round, deformed, damaged, or contain defects that could impair concrete surface.

G. Protect forms from rain and snow if work is delayed and forms have been positioned for placing concrete.

H. Place waterproof sheeting over top of forms to prevent damage to interior surface by rain or snow.

I. Do not allow forms to stand in water or snow before placing concrete.

3.3 PLACING CONCRETE

A. Place concrete as specified in Section 03300, unless otherwise specified in this section.

B. Do not place concrete if column forms are wet.

C. Apply form release coating to interior surface.

D. Place concrete at pour rate in accordance with manufacturer's instructions. Sonotube RainGuard is sold in standard lengths of 12 feet. Sonotube Commercial is sold in standard lengths of 20 feet. Either form can be poured to this full height without pour rate restrictions, as indicated on product label. For lengths in excess of these standards, call for instructions

E. Do not touch interior surface of forms with vibrator.

F. Do not vibrate concrete from exterior of forms.

3.4 REMOVAL

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A. Remove column forms in accordance with manufacturer's instructions.

B. Adhesion of Concrete to Form increases over time. If removal of the form is required, remove as soon as operations will not damage concrete, a minimum of 24 hours and a maximum of 5 days after placing concrete is recommended.

~~C.~~Prevent damage to concrete ~~from~~ due to form removal.

C.

~~D.~~Removal of the form is not necessary except as required by Engineering design or local Building Code.

D.

~~Specifier Notes: Delete protection for the concrete columns if not required.~~

3.5 PROTECTION

A. Protect concrete columns during remaining construction by placing form halves loosely around columns and securing. Ensure concrete surface is fully dry.

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SECTION 03 30 53
(SHORT-FORM) CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies cast-in-place structural concrete and material and mixes for other concrete.

1.2 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Concrete sign bases, and similar exterior site work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

1.3 TOLERANCES:

A. ACI 117

1.4 REGULATORY REQUIREMENTS:

A. ACI SP-66 ACI Detailing Manual

B. ACI 318 - Building Code Requirements for Reinforced Concrete

1.5 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Concrete Mix Design

C. Shop Drawings: Reinforcing steel: Complete shop drawings

D. Manufacturer's Certificates: Air-entraining admixture, chemical admixtures, curing compounds

1.6 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):

117-10 ..... Specification for Tolerances for Concrete Construction, Materials and Commentary

211.1-91(R2009) ..... Standard Practice for Proportions for Normal, Heavyweight, and Mass Concrete

301-10 ..... Specifications for Structural Concrete

305.1-06 ..... Specification for Hot Weather Concreting

306.1-90(R2002) ..... Standard Specification for Cold Weather Concreting

SP-66-04 ..... ACI Detailing Manual

318-11 ..... Building Code Requirements for Structural Concrete and Commentary

347-04 ..... Guide to Formwork for Concrete

C. American Society for Testing And Materials (ASTM):

A185/A185M-07 ..... Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement

A615/A615M-09 ..... Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

C31/C31M-10 ..... Standard Practice for Making and Curing Concrete Test Specimens in the Field

C33/C33M-11a ..... Standard Specification for Concrete Aggregates

C39/C39M-12 ..... Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C94/C94M-12 ..... Standard Specification for Ready Mixed Concrete

C143/C143M-10 ..... Standard Test Method for Slump of Hydraulic Cement Concrete

C150-11..... Standard Specification for Portland Cement

C171-07..... Standard Specification for Sheet Material for Curing Concrete

C172-10..... Standard Practice for Sampling Freshly Mixed Concrete

C173-10..... Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C192/C192M-07 ..... Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

C231-10..... Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C260-10..... Standard Specification for Air-Entraining Admixtures for Concrete

C494/C494M-11 ..... Standard Specification for Chemical Admixtures for Concrete

C618-12..... Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

D1751-04(R2008) ..... Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

D4397-10..... Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

E1155-96(2008) ..... Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers

PART 2 - PRODUCTS

2.1 FORMS:

Wood, plywood, metal, or other materials, approved by Project Engineer, of grade or type suitable to obtain type of finish specified.

2.2 MATERIALS:

A. Portland Cement: ASTM C150, Type I or II.

B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalis, and loss on ignition (LOI) not to exceed 5 percent.

C. Coarse Aggregate: ASTM C33, Size 67. Size 467 may be used for footings and walls over 300 mm (12 inches) thick. Coarse aggregate for applied topping and metal pan stair fill shall be Size 7.

F. Mixing Water: Fresh, clean, and potable.

G. Air-Entraining Admixture: ASTM C260.

H. Chemical Admixtures: ASTM C494.

J. Reinforcing Steel: ASTM A615, deformed. See structural drawings for grade.

K. Welded Wire Fabric: ASTM A185.

L. Expansion Joint Filler: ASTM D1751.

M. Sheet Materials for Curing Concrete: ASTM C171.

Q. Grout, Non-Shrinking: Premixed ferrous or non-ferrous, mixed and applied in accordance with manufacturer's recommendations. Grout shall show no settlement or vertical drying shrinkage at 3 days or thereafter based on initial measurement made at time of placement, and produce a compressive strength of at least 18mpa (2500 psi) at 3 days and 35mpa (5000 psi) at 28 days.

2.3 CONCRETE MIXES:

A. Design of concrete mixes using materials specified shall be the responsibility of the Contractor as set forth under Option C of ASTM C94.

B. Compressive strength at 28 days shall be not less than 25 mpa (3000 psi).

C. Establish strength of concrete by testing prior to beginning concreting operation. Test consists of average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.

D. Maximum slump for vibrated concrete is 100 mm (4 inches) tested in accordance with ASTM C143.

E. Cement and water factor (See Table I):

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m^3 (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m^3 (lbs/c. yd)	Max. Water Cement Ratio
35 (5000)[1,3]	375 (630)	0.45	385 (650)	0.40
30 (4000)[1,3]	325 (550)	0.55	340 (570)	0.50
25 (3000)[1,3]	280 (470)	0.65	290 (490)	0.55
25 (3000)[1,2]	300 (500)	*	310 (520)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 8.3 MPa (1200 psi) in excess of f'c. For concrete strengths above 35 Mpa (5000 psi), the proposed mix design shall achieve a compressive strength 9.7 MPa (1400 psi) in excess of f'c.
2. Lightweight Structural Concrete. Pump mixes may require higher cement values.
3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
4. Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.

F. Air-entrainment is required for all exterior concrete and as required for Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS. Air content shall conform with the following table:

TABLE I - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)

Nominal Maximum Size of Coarse Aggregate	Total Air Content Percentage by Volume
10 mm (3/8 in)	6 to 10
13 mm (1/2 in)	5 to 9
19 mm (3/4 in)	4 to 8
25 mm (1 in)	3 1/2 to 6 1/2
40 mm (1 1/2 in)	3 to 6

2.4 BATCHING & MIXING:

A. Store, batch, and mix materials as specified in ASTM C94.
   1. Job-Mixed: Concrete mixed at job site shall be mixed in a batch mixer in manner specified for stationary mixers in ASTM C94.
   2. Ready-Mixed: Ready-mixed concrete comply with ASTM C94, except use of non-agitating equipment for transporting concrete to the site will not be permitted. With each load of concrete delivered to project, ready-mixed concrete producer shall furnish, in duplicate, certification as required by ASTM C94.

PART 3 - EXECUTION

3.1 FORMWORK:

A. Installation conform to ACI 347. Sufficiently tight to hold concrete without leakage, sufficiently braced to withstand vibration of concrete, and to carry, without appreciable deflection, all dead and live loads to which they may be subjected.

B. Treating and Wetting: Treat or wet contact forms as follows:
   1. Coat plywood and board forms with non-staining form sealer. In hot weather cool forms by wetting with cool water just before concrete is placed.

2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather cool metal forms by thoroughly wetting with water just before placing concrete.
3. Use sealer on reused plywood forms as specified for new material.
4. Paper tube forms do not require wetting or oiling.

C. Inserts, sleeves, and similar items: Flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned and built into construction, and maintained securely in place.

D. Construction Tolerances:
1. Contractor is responsible for setting and maintaining concrete formwork to assure erection of completed work within tolerances specified to accommodate installation or other rough and finish materials. Remedial work necessary for correcting excessive tolerances is the responsibility of the Contractor. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.
2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 REINFORCEMENT:

Details of concrete reinforcement, unless otherwise shown, in accordance with ACI 318 and ACI SP-66. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

3.3 PLACING CONCRETE:

A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval of Project Engineer before placing concrete. Provide screeds at required elevations for concrete horizontals.

B. Before placing new concrete on or against concrete which has set, existing surfaces shall be roughened and cleaned free from all laitance, foreign matter, and loose particles.

C. Convey concrete from mixer to final place of deposit by method which will prevent segregation or loss of ingredients. Do not deposit in work concrete that has attained its initial set or has contained its water or cement more than 1 1/2 hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work. Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Vibration shall be carried on continuously with placing of concrete.

D. Hot weather placing of concrete: Follow recommendations of ACI 305R to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete.

E. Cold weather placing of concrete: Follow recommendations of ACI 306R, to prevent freezing of thin sections less than 300 mm (12 inches) and to permit concrete to gain strength properly, except that use of calcium chloride shall not be permitted without written approval from Project Engineer.

3.4 PROTECTION AND CURING:

Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by Project Engineer.

3.5 FORM REMOVAL:

Forms remain in place until concrete has a sufficient strength to carry its own weight and loads supported. Removal of forms at any time is the Contractor's sole responsibility.

3.6 SURFACE PREPARATION:

Immediately after forms have been removed and work has been examined and approved by Project Engineer, remove loose materials, and patch all stone pockets, surface honeycomb, or similar deficiencies with cement mortar made with 1 part Portland cement and 2 to 3 parts sand.

3.7 FINISHES:

A. Vertical and Overhead Surface Finishes:

1. Unfinished Areas: Vertical and overhead concrete surfaces exposed in unfinished areas, above suspended ceilings in manholes, and other unfinished areas exposed or concealed will not require additional finishing.
2. Interior and Exterior Exposed Areas (to be painted): Fins, burrs and similar projections on surface shall be knocked off flush by mechanical means approved by Project Engineer and rubbed lightly with a fine abrasive stone or hone. Use an ample amount of water during rubbing without working up a lather of mortar or changing texture of concrete.
3. Interior and Exterior Exposed Areas (finished): Finished areas, unless otherwise shown, shall be given a grout finish of uniform color and shall have a smooth finish treated as follows:
    a. After concrete has hardened and laitance, fins and burrs have been removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone or stone.
    b. Apply grout composed of 1 part Portland cement and 1 part clean, fine sand (smaller than 600 micro-m (No. 30) sieve). Work grout into surface of concrete with cork floats or fiber brushes until all pits and honeycomb are filled.
    c. After grout has hardened, but still plastic, remove surplus grout with a sponge rubber float and by rubbing with clean burlap.

d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish for any area in same day. Confine limits of finished areas to natural breaks in wall surface. Do not leave grout on concrete surface overnight.

B. Horizontal Surface Finishes:

1. Scratch Finish: Horizontal surfaces to receive a bonded applied cementitious application shall all be thoroughly raked or wire broomed after partial setting (within 2 hours after placing) to roughen surface to insure a permanent bond between base horizontal and applied cementitious materials.
2. Floating: Allow water brought to surface by float used for rough finishing to evaporate before surface is again floated or troweled. Do not sprinkle dry cement on surface to absorb water.
3. Float Finish: Sign bases, mowstrips, and horizontals to receive non-cementitious materials, except as specified, shall be screened and floated to a smooth dense finish. After first floating, while surface is still soft, surfaces shall be checked for alignment using a straightedge or template. Correct high spots by cutting down with a trowel or similar tool and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections on floated finish by rubbing or dry grinding. Refloat the horizontal to a uniform sandy texture.
4. Broom Finish: Finish all exterior horizontal concrete surfaces with a bristle brush moistened with clear water after the surfaces have been floated.
5. Finished horizontal flatness (FF) and levelness (FL) values comply with the following minimum requirements:

Horizontal on grade & Shored suspended horizontals	Unshored suspended horizontals
Specified overall value F_F 25/F_L 20	Specified overall value F_F 25
Minimum local value F_F 17/F_L 15	Minimum local value F_F 17

3.8 SURFACE TREATMENTS:

A. Surface treatments shall be mixed and applied in accordance with manufacturer's printed instructions.

3.9 APPLIED TOPPING:

A. Separate concrete topping with thickness and strength shown with only enough water to insure a stiff, workable, plastic mix.

B. Continuously place applied topping until entire section is complete, struck off with straightedge, compact by rolling or tamping, float and steel trowel to a hard smooth finish.

- - - E N D - - -

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

B. Items specified.

1. Support for Wall and Ceiling Mounted Items: (12, 14A, 14C)

1.2 RELATED WORK

A. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES

B. Prime and finish painting: Section 09 91 00, PAINTING

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data: Frames, each type

C. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

D. Manufacturer's Certificates:

1. Live load designs as specified.

E. Design Calculations for specified live loads including dead loads.

F. Furnish setting drawings and instructions for installation of anchors to be preset into concrete work, and for the positioning of items having anchors to be built into concrete construction.

1.4 QUALITY ASSURANCE

A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.

B. Each product type shall be the same and be made by the same manufacturer.

C. Assembled product to the greatest extent possible before delivery to the site.

D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Mechanical Engineers (ASME):

B18.6.1-97 ..... Wood Screws

B18.2.2-87(R2005) ..... Square and Hex Nuts

C. American Society for Testing and Materials (ASTM):

A36/A36M-08 ..... Structural Steel

A47-99(R2009) ..... Malleable Iron Castings

A48-03(R2008) ..... Gray Iron Castings

A53-10 ..... Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123-09 ..... Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A167-99(R2009) ..... Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A269-10 ..... Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A307-10 ..... Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A653/A653M-10 ..... Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

C1107-08 ..... Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

F436-10 ..... Hardened Steel Washers

F468-10 ..... Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

F593-02(R2008) ..... Stainless Steel Bolts, Hex Cap Screws, and Studs

F1667-11 ..... Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):

D1.1-10 ..... Structural Welding Code Steel

D1.3-08 ..... Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 521-01 ..... Pipe Railing Manual

AMP 500-06 ..... Metal Finishes Manual

MBG 531-09 ..... Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:

SP 1-04 ..... No. 1, Solvent Cleaning

SP 2-04 ..... No. 2, Hand Tool Cleaning

SP 3-04 ..... No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.

2.2 MATERIALS

A. Structural Steel: ASTM A36.

B. Stainless Steel: ASTM A167, Type 302 or 304.

C. Steel Pipe: ASTM A53.

1. Galvanized for exterior locations.
2. Type S, Grade A unless specified otherwise.
3. NPS (inside diameter) as shown.

D. Primer Paint: As specified in Section 09 91 00, PAINTING.

E. Modular Channel Units:

1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
2. Form channel with in turned pyramid shaped clamping ridges on each side.
3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.3 mm (0.0125 inch) thick stainless steel.

F. Grout: ASTM C1107, pourable type.

2.3 HARDWARE

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.

B. Fasteners:

1. Bolts with Nuts:
   a. ASME B18.2.2
   b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts
   c. ASTM F468 for nonferrous bolts

d. ASTM F593 for stainless steel

2. Screws: ASME B18.6.1
3. Washers: ASTM F436, type to suit material and anchorage.
4. All fasteners exposed to weather shall be stainless steel.

2.4 FABRICATION GENERAL

A. Material
   1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
   2. Use material free of defects which could affect the appearance or service ability of the finished product.

B. Size:
   1. Size and thickness of members as shown.
   2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. Connections
   1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
   2. Field riveting will not be approved.
   3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
   4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.
   5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
   6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.

D. Fasteners and Anchors
   1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
   2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
   3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
   4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.

5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self drilling and tapping screws or bolts.

E. Workmanship

1. General:
   a. Fabricate items to design shown.
   b. Furnish members in longest lengths commercially available within the limits shown and specified.
   c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
   d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
   e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
   f. Prepare members for the installation and fitting of hardware.
   g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
   h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
   a. Weld in accordance with AWS.
   b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
   c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
   d. Finish welded joints to match finish of adjacent surface.
3. Joining:
   a. Miter or butt members at corners.
   b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
   a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.

b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.

5. Cutting and Fitting:
   a. Accurately cut, machine and fit joints, corners, copes, and miters.
   b. Fit removable members to be easily removed.
   c. Design and construct field connections in the most practical place for appearance and ease of installation.
   d. Fit pieces together as required.
   e. Fabricate connections for ease of assembly and disassembly without use of special tools.
   f. Joints firm when assembled.
   g. Conceal joining, fitting and welding on exposed work as far as practical.
   h. Do not show rivets and screws prominently on the exposed face.
   i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

F. Finish:
   1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
   2. Steel and Iron: NAAMM AMP 504.
      a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
      b. Surfaces exposed in the finished work:
         1) Finish smooth rough surfaces and remove projections.
         2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
      c. Shop Prime Painting:
         1) Surfaces of Ferrous metal:
            a) Items not specified to have other coatings.
            b) Galvanized surfaces specified to have prime paint.
            c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
            d) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
            e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
   3. Stainless Steel: NAAMM AMP-504 Finish No. 4.

G. Protection:

1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

A. General:
   1. Fabricate ASTM A36 structural steel shapes as shown.
   2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
   3. Field connections may be welded or bolted.
B. For Wall Mounted Items:
   1. For items supported by metal stud partitions.
   2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
   3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
   4. Steel hat channels where shown. Flange cut and flatted for anchorage to stud.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
B. Items set into concrete or masonry.
   1. Provide temporary bracing for such items until concrete or masonry is set.
   2. Place in accordance with setting drawings and instructions.
   3. Build strap anchors, into masonry as work progresses.
C. Set frames of gratings, covers, corner guards, trap doors and similar items flush with finish floor or wall surface and, where applicable, flush with side of opening.
D. Field weld in accordance with AWS.
   1. Design and finish as specified for shop welding.
   2. Use continuous weld unless specified otherwise.
E. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
F. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.
G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.

H. Secure escutcheon plate with set screw.

3.2 INSTALLATION OF SUPPORTS

A. Anchorage to structure.
   1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
   2. Secure supports to concrete inserts by bolting or continuous welding as shown.
   3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
   4. Secure steel plate or hat channels to studs as detailed.

B. Supports for Wall Mounted items:
   1. Locate center of support at anchorage point of supported item.
   2. Locate support at top and bottom of wall hung items.
   3. Locate supports where required for items shown.

3.4 CLEAN AND ADJUSTING

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

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SECTION 09 06 00
SCHEDULE FOR FINISHES

VAMC: West Los Angeles Healthcare Center

Location: Los Angeles, California

Project No. and Name: 691-13-105WL, Install Exterior Signage Campus Wide – Phase I

Submission

Date:

SECTION 09 06 00
SCHEDULE FOR FINISHES

PART I – GENERAL

1.1 DESCRIPTION

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES-provide quadruplicate samples for color approval of materials and finishes specified in this section.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.

B. MASTER PAINTING INSTITUTE: (MPI)

2001 .....Architectural Painting Specification Manual

PART 2- PRODUCTS

2.1 DIVISION 03 – CONCRETE

A. SECTION 03 30 53, MISCELLANEOUS CAST-IN-PLACE CONCRETE

Surface	Finish Description

B. SECTION 03 45 00, PRECAST ARCHITECTURAL CONCRETE

Finish Color	Texture	Finish	Manufacturer	Mfg. Color Name/No.

2.2 DIVISION 05 – METALS

A. SECTION 05 50 00, METAL FABRICATION

Item	Finish
Loose Lintels	

2.3 DIVISION 07 - THERMAL AND MOISTURE PROTECTION

A. SECTION 07 92 00, JOINT SEALANTS

Location	Color	Manufacturer	Manufacturer Color
New to Existing Walls			

2.4 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door	
Component	Color of Paint Type and Gloss
Door	
Frame	
Window frame	

B. SECTION 08 14 00, WOOD DOORS

Component	Finish/Color
Doors	
Frames	

C. SECTION 08 31 13, ACCESS DOORS AND FRAMES

Material	Finish/Color
Steel	
Stainless steel	

D. SECTION 08 71 00, DOOR HARDWARE

Item	Material	Finish
Hinges		
Door Closers		
Closer/ Holder		
Floor Stops		
Door Holders		
Lock/ Latches		
Armor Plates	Metal Plastic	
Kick Mop Plates	Metal Plastic	
Door Edging		
Door Pulls		
Push Plates		
Combination Push Pull Plate		
Weather Strip		
Threshold		

2.5 DIVISION 09 - FINISHES

A. SECTION 09 30 13, CERAMIC TILING

1. SECTION 09 30 13, PORCELAIN PAVER TILE (PPT)

Finish Code	Size	Shape	Pattern	Manufacturer	Mfg. Color Name/No.

2. SECTION 09 30 13, PORCELAIN PAVER TILE GROUT

Finish Code	Manufacturer	Mfg. Color Name/No.

3. SECTION 09 30 13, MARBLE THRESHOLDS

Marble Type	Manufacturer	Mfg. Color Name/No.

B. SECTION 09 65 13, RESILIENT BASE STAIR TREADS AND ACCESSORIES

Finish Code	Item	Height	Manufacturer	Mfg Name/No.
	Rubber Base (RB)			
	Vinyl Base (VB)			
	Resilient Stair Treads (RST)			
	Sheet Rubber Flooring (SRF)			

C. SECTION 09 67 23, EPOXY RESINOUS FLOORING (ERF)

Finish code	Manufacturer	Mfg. Color Name/No.

D. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards

	Gloss @60	Sheen @85
Gloss Level 1	a traditional matte finish-flat	max 5 units, and max 10 units
Gloss Level 2	a high side sheen flat-“a velvet-like” finish	max 10 units, and 10-35 units
Gloss Level 3	a traditional “egg-shell like” finish	10-25 units, and 10-35 units
Gloss Level 4	a “satin-like” finish	20-35 units, and min. 35 units
Gloss Level 5	a traditional semi-gloss	35-70 units
Gloss Level 6	a traditional gloss	70-85 units

Gloss level 7 a high gloss more than 85 units

2. Paint code	Gloss	Manufacturer	Mfg. Color Name/No.
P			
P			
P			
P			
P			
P			
P			

2.10 DIVISION 10 - SPECIALTIES

A. SECTION 10 14 00, INTERIOR SIGNS

Sign Type	Component	Manufacturer	Mfg. Color Name/No.

B. SECTION 10 44 13, FIRE EXTNGUISHER CABINETS

Component	Material	Finish

C. SECTION 10 28 00, TOILET AND BATH ACCESSORIES

Item	Material	Manufacturer	Mfg. Color Name/No.

2.11 DIVISION 13 - SPECIAL CONSTRUCTION

A. SECTION 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON STRUCTURAL COMPONENETS

Item	Location	Finish	Color

2.12 DIVISION 22 - PLUMBING

A. SECTION 22 40 00, PLUMBING FIXTURES AND TRIM

Item	Color
Water Closet	
Urinal	
Bathtubs	
Lavatories	
Service Sink Corner	
Service Sink	
Clinic Service Sink	
Plaster Sink	
Laundry Tub	

2.13 DIVISON 26 - ELECTRICAL

A. SECTION 26 51 00, BUILDING LIGHTING INTERIOR

Fixture Type	Exterior Finish	Color

PART III EXECUTION

3.1 FINISH SCHEDULES & MISCELLANEOUS ABBREVIATIONS

FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS	
Term	Abbreviation
Concrete	C
Epoxy Resin Flooring	ERF
Existing	E
Gypsum Wallboard	GWB
Marble	MB
Material	MAT
Natural Finish	NF
Paint	P
Paver Tile	PVT
Porcelain Paver Tile	PPT
Stain	ST
Vinyl Base	VB
Wall Border	WB
Wood	WD

3.2 FINSIH SCHEDULE SYMBOLS

Symbol Definition

** Same finish as adjoining walls

- No color required

E Existing

XX To match existing

EFTR Existing finish to remain

RM Remove

3.3 ROOM FINISH SCHEDULE

A. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.

B. ROOM FINISH SCHEDULE

Room No. and Name		FLOOR			BASE		WALL		WAINSCOT		CEILING		REMARKS
		MAT	FC		MAT	FCC	MAT	FCC	MAT	FC	MAT	FCC	
	EXIST			N									
				E									
				S									
				W									
				C									
	NE			N									
				E									
				S									

	W			W								
				C								
	EXIST			N								
				E								
				S								
				W								
				C								
	NEW			N								
				E								
				S								
				W								
				C								
	EXIST			N								
				E								
				S								
				W								
				C								
	NEW			N								
				E								
				S								
				W								
				C								

--- E N D---

SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies exterior medical center identification, directional, wayfaring, building identification signs, and parking and traffic signs.

1.2 RELATED WORK

A. Electrical: Related Electrical Specification Sections
B. Lighted signs are specified under Division 26, ELECTRICAL.
C. Color Finish: Section 09 06 00, SCHEDULE FOR FINISHES

1.3 MANUFACTURER'S QUALIFICATIONS

Sign manufacturer shall provide evidence that they regularly and presently manufactures signs similar to those specified in this section as one of their principal products.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
B. Samples: Sign panels and frames, with letters and symbols, each type. Submit 2 sets. One set of samples will be retained by Project Engineer, other returned to Contractor.
    1. Sign Panel, 200 mm x 250 mm (8 inches x 10 inches), with letters.
    2. Color samples of each color, 150 mm x 150 mm (6 inches x 6 inches. Show anticipated range of color and texture.
    3. Sample of typeface, arrow and symbols in a typical full size layout.
C. Manufacturer's Literature:
    1. Showing the methods and procedures proposed for the concealed anchorage of the signage system to each surface type.
    2. Manufacturer’s printed specifications, anchorage details, installation and maintenance instructions.
D. Samples: Sign location plan, showing location, type and total number of signs required.
E. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
F. Full size layout patterns for dimensional letters.

1.5 DELIVERY AND STORAGE

A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.
B. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.

C. Deliver signs only when the site and mounting services are ready for installation work to proceed.

D. Store products in dry condition inside enclosed facilities.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C. Federal Specifications (Fed Spec):

MIL-PRF-8184F.....Plastic Sheet, Acrylic, Modified

MIL-P-46144C.....Plastic Sheet, Polycarbonate

D. Disabled Accessibility:

Architectural Barriers Act Accessibility Standard (ABAAS)

VA Barrier Free Design Guide, PG-18-13

1.7 MINIMUM SIGN REQUIREMENTS

A. General:

1. Type Styles: Characters shall be uppercase, Helvetica Medium, Helvetica Medium Condensed, and Helvetica Regular.
   a. Characters shall have a width-to-height ratio between 3:5 and 1:1.
   b. Characters shall have a stroke width-to-height ratio of between 1:5 and 1:10.
2. Character Height:
   a. Minimum 16 mm (5/8 inch) high, Maximum 50 mm (2 inches).
   b. Minimum 75 mm (3 inches) high for overhead signs.
   c. As shown for directional signs.
3. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 inches) high.
4. Finish and Contrast: Characters and background shall be eggshell, matte or other non-glare finish with adequate contrast with background.
5. Mounting Location and Height: As shown.
6. Provide Tactile and Braille Characters per ABAAS standards, raised minimum 0.793 mm (1/32 in). Characters shall be accompanied by Grade 2 Braille.

1.8 COLORS AND FINISHES:

Section 09 06 00, SCHEDULE FOR FINSIHES

PART 2 - PRODUCTS

2.1 GENERAL

A. Signs of type, size and design shown on the drawings and as specified.

B. Signs complete with lettering, framing and related components for a complete installation.

C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.

D. Do not scale drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. Project Engineer to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.

E. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of his warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

2.2 PRODUCTS

A. Aluminum:
   1. Sheet and Plate: ASTM B209
   2. Extrusions and Tubing: ASTM B221

B. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matte finish water white clear acrylic shall not be acceptable.

C. Polycarbonate: MIL-P-46144C; Type I, class 1

D. Phenolic Panels: See Section 10 14 23.

E. Vinyl: 0.1 mm thick machine cut, having a pressure sensitive adhesive and integral colors.

F. Electrical Signs:
   1. General: Furnish and install all lighting, electrical components, fixtures and lamps ready for use in accordance with the sign type drawings, details and specifications.
   2. Refer to Electrical Specifications Section, Division 26, ELECTRICAL, to verify line voltages for sign locations that require electrical signs.
   3. Quality Control: Installed electrical components and sign installations are to bear the label and certification of Underwriters Laboratories, Inc., and are to comply with National Electrical Code as well as applicable federal, state and local codes for installation techniques, fabrication methods, and general product safety.
   4. Ballast and Lighting Fixtures: See Electrical Specifications.

G. Concrete Post Footings and sign pedestals: See Section 03 30 53, MISCELLANEOUS CAST-IN-PLACE CONCRETE and Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

H. Metals: See Section 05 50 00, MISCELLANEOUS METALS.

2.3 SIGN STANDARDS

A. Topography:

1. Type Style: Helvetica Medium and Helvetica Medium Condensed. Initial caps or all caps as indicated in Sign Message Schedule.
2. Arrow: See graphic standards in drawings.
3. Letter spacing: See graphic standards on drawings.
4. Letter spacing: See graphic standards on drawings.
5. All text, arrows, and symbols to be provided in size, colors, typefaces and letter spacing shown. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Text shown in drawings are for layout purposes only; final text for signs is listed in Sign Message Schedule.

B. Project Colors and Finishes: See Section 09 06 00, SCHEDULE FOR FINISHES.

2.4 SIGN TYPES

A. General:

1. The interior sign system is comprised of sign types families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family.

a. IN indicates a component construction based sign.

1. The exterior sign system shall be comprised of sign types families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family.
2. EI designation indicates exterior internally illuminated sign.
3. EN designation indicates exterior non-illuminated sign.

B. Interchangeable Component System:

1. Sign Type Families: 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, and 17.
2. Interior sign system capable of being arranged in a variety of configurations with a minimum of attachments, devices and connectors.
    a. Interchangeable nature of the system shall allow for changes of graphic components of the installed sign, without changing sign in its entirety.
    b. Component Sign System is comprised of the following primary components:
        1) Rail Back utilizing horizontal rails, spaced to allow for uniform, modular sizing of sign types.
        2) Rail Insert mounted to back of Copy Panels to allow for attachment to Rail Back.

3) Copy Panels, made of a variety of materials to allow for different graphic needs.
4) End Caps which interlock to Rail Back to enclose and secure changeable Copy Panels.
5) Joiners and Accent Joiners connect separate Rail Backs together.
6) Top Accent Bars which provide decorative trim cap that encloses the top of sign or can connect the sign to a Type 03 Room Number Sign.

c. Rail Back, Rail Insert and End Caps in anodized extruded aluminum to allow for tight tolerances and consistent quality of fit and finish.
d. Signs in system shall be convertible in the field to allow for enlargement from one size to another in height and width through use of Joiners or Accent Joiners, which connect Rail Back panels together blindly, providing a butt joint between Copy Panels. Accent Joiners shall connect Rail Backs together with a visible 3 mm (0.125 inch) horizontal rib, flush to the adjacent copy insert surfaces.
e. Sign configurations shall vary in width from 225 mm (9 inches) to 2050 mm (80 inches), and have height dimensions of 50 mm (2 inches), 75 mm (3 inches), 150 mm (6 inches), 225 mm (9 inches) and 300 mm (12 inches). Height shall be increased beyond 300 mm (12 inches), by repeating height module in full or in part.

3. Rail Back functions as internal structural member of sign using 6063T5 extruded aluminum and anodized black.
   a. Shall accept an extruded aluminum or plastic insert on one sign or on both sides, depending upon sign type.
   b. Shall be convertible in field to allow for connection to other Rail Back panels, so that additive changes can be made to sign unit.
   c. Rail shall allow for a variety of mounting devices including wall mounting for screw-on applications, using pressure sensitive tape, freestanding mount, ceiling mount and other mounting devices as needed.
4. Rail Insert functions as a mounting device for Copy Panels on to the Rail Back. The Rail Insert mounts to the back of the Copy Panel with adhesive suitable for use with the particular copy insert material.
   a. Shall allow Copy Panels to slide or snap into the horizontal Rail Back for ease of changeability.
   b. Shall mount to the back of the Copy Panel with adhesive suitable for use with particular Copy Panel material.
5. Copy Panels shall accept various forms of copy and graphics, and attaches to the Rail Back with the Rail Insert. Copy Panels shall be either ABS plastic with integral color or an acrylic lacquer finish; photo polymer; or, acrylic.

a. Interchangeable by sliding horizontally from either side of sign, and to other signs in system of equal or greater width or height.
b. Cleanable without use of special chemicals or cleaning solutions.
c. Copy Insert Materials.
    1) ABS Inserts - 2.3 mm (0.090 inch) extruded ABS plastic core with .07 mm (0.003 inch) acrylic cap bonded during extrusion/texturing process. Pressure bonded to extruded Rail Insert using adhesive. Background color is either integral or painted in acrylic lacquer. ABS inserts finished in a chromium industries #HM335RA texture pattern to prevent glare.
    2) Photo polymer Inserts - 3 mm (0.125 inch) phenolic photo polymer with raised copy etched to 2.3 mm (0.0937 inch), bonded to an ABS plastic or extruded aluminum insert with adhesive. Background color is painted in acrylic enamel.
    3) Changeable Paper/ Insert Holder - Extruded insert holder with integral Rail Insert for connection with structural back panel in 6063T5 aluminum with a black anodized finish. Inserts into holder are paper with a clear 0.7 mm (0.030 inch) textured cover. Background color is painted in acrylic lacquer.
    4) Acrylic - 2 mm (0.080 inch) non-glare acrylic. Pressure bonded to extruded Rail Insert using adhesive. Background color is painted in acrylic lacquer or acrylic enamel.
    5) Extruded 6063T5 aluminum with a black anodized finish Insert Holder with integral Rail Insert for connection with Structural Back Panel to hold a 0.7 mm (0.030 inch) textured polycarbonate insert and a Sliding Tile which mounts in the Inset Holder and slides horizontally.
    6) End Caps - Extruded using 6063T5 aluminum with a black anodized. End Caps interlock with Rail Back with clips to form an integral unit, enclosing and securing the changeable Copy Panels, without requiring tools for assembly.
        a) Shall be interchangeable to either end of sign and to other signs in the system of equal height.
        b) Mechanical fasteners can be added to the End Caps that will secure it to Rail Back to make sign tamper resistant.
    7) Joiners - Extruded using 6063T5 aluminum with a black anodized finish. Rail Joiners connect Rail Backs together blindly, providing a butt joint between Copy Inserts.
    8) Accent Joiners - Extruded using 6063T5 aluminum with a mirror polished finish. Joiner shall connect Rail Backs together with a visible 3 mm (0.125 inch) horizontal rib, flush to the adjacent Copy Panel surfaces.
    9) Top Accent Rail - Extruded using 6063T5 aluminum with a mirror polished finish. Rail shall provide 3 mm (0.125 inch) high decorative trim cap, which butts flush to adjacent Copy Panel and encloses top of Rail Back and Copy Panel.

10) Typography
    a) Vinyl First Surface Copy (non-tactile) - Applied Vinyl copy.
    b) Subsurface Copy Inserts - Textured 1 mm (0.030 inch) clear polycarbonate face with subsurface applied Vinyl copy. Face shall be back sprayed with paint and laminated to an extruded aluminum carrier insert.
    c) Integral Tactile Copy Inserts - phenolic photo polymer etched with 2.3 mm (0.0937 inch) raised copy.
    d) Silk-screened First Surface Copy (non-tactile) - Injection molded or extruded ABS plastic or aluminum insert with first surface applied enamel silk-screened copy.

C. Sign Type Family 01, 02.01 thru 02.05, 08, 09 and 20:
    1. All text and graphics are to be first surface silk-screened.
    2. IN-01.12 & IN-01.13: Refer to Sign Type 03 specification for tactile and Braille portion of sign.
    3. IN-02.4: All text and graphics are to be first surface vinyl letters.
    4. IN-01.1: Preparation of artwork for reproduction of "fire and emergency evacuation maps" is by manufacturer.
D. Sign Type Families 03:
    1. Tactile sign is to be made from a material that provides for letters, numbers and Braille to be integral with sign plaque material such as: photosensitive polyamide resin, etched metal, sandblasted phenolic or embossed material. Do not apply letters, numbers and Braille with adhesive.
    2. Numbers, letters and Braille to be raised 0.793 mm (0.0312 inch) from the background surface. The draft of the letters, numbers and Braille to be tapered, vertical and clean.
    3. Braille dots are to conform with standard dimensions for literary Braille; (a) Dot base diameter: 1.5 mm (0.059 inch) (b) Inter-dot spacing: 2.3 mm (0.090 inch) (c) Horizontal separation between cells: 6.0 mm (0.241 inch) (d) Vertical separation between cells: 10.0 mm (0.395 inch).
    4. Entire assembly is painted in specified color. After painting, apply white or other specified color to surface of the numbers and letters. Entire sign is to have a protective clear coat sealant applied.
    5. Complete sign is to have an eggshell finish (11 to 19 degree on a 60 degree glossmeter).
E. Sign Type Family 04 and 11:
    1. All text and graphics are to be first surface applied vinyl letters.
    2. IN-04: When a Type IN-04 is to be mounted under a Type IN03, a connecting Accent Joiner is to be used to create a singular integrated sign.
F. Sign Type 05:
    1. Text if added to Copy Insert module to be first surface applied vinyl letters.

G. Sign Type Family 06 and 07:
   1. A11 text and graphics are to be first surface applied vinyl letters except for under sliding tile.
   2. Protect text, which is covered by sliding tile, so tile does not wear away letters.

H. Sign Type Family 10:
   1. Pocket depth is to be 0.3 mm (0.0150 inch).

I. Sign Type Family 12 and 13:
   1. A11 text and graphics are to be first surface applied vinyl letters.
   2. IN-12: Provide felt, cork or similar material on bottom of desk mounting bracket to protect counter surfaces.

J. Sign Type Family 14, 15, and 16:
   1. A11 text and graphics are to be first surface applied vinyl letters.
   2. IN-14.06: When added to top of IN-14.01, IN-14.04, or IN-14.05 a connecting Accent Joiner is to be used to create a singular integrated sign.
   3. Ceiling mounted signs required mounting hardware on the sign that allows for sign disconnection, removal and reinstallation and reconnection.

K. Sign Type Family 17:
   1. A11 text and graphics are to be first surface applied vinyl letters.
   2. IN-17: Directory constructed using elements of the Component System.

L. Sign Type Family 18:
   1. A11 text and graphics are to be first surface applied stylus cut vinyl letters.
   2. Provide in specified typeface, color and spacing, with each message or message group on a single quick release backing sheet.

M. Sign Type Family 19:
   1. Dimensional letters are mill or laser cut acrylic in the size and thickness noted in the drawings.
   2. Draft of letters is perpendicular to letters face.
   3. All corners such as where a letter stem and bar intersect are to be square so the letter form is accurately reproduced.
   4. Paint letters with acrylic polyurethane in specified color and finish.

N. Sign Type Family (See Specialty Signs Section) 21:
   1. IN-21.01: 57 mm (2.25 inches) polished aluminum tube mounted to weighted 356 mm (14 inches) diameter polished aluminum base. Sign bracket to hold a 6 mm (0.25 inch) sign plaque.
   2. IN-21.02: 57 mm (2.25 inches) polished aluminum tube vertical support mounted to a weighted polished 57 mm (2.25 inches) aluminum tubular base. Rail Back mechanically connected to vertical supports with Copy Panel attached to front and back.
   3. IN-21.03 & 21.04: IN-21.02: 57 mm (2.25 inches) polished aluminum tube vertical support mounted to a weighted polished 57 mm (2.25 inches) aluminum tubular base. Rail Back

mechanically connected to vertical supports with hinged locking glass door. Black felt covered changeable letter board or tan vinyl impregnated cork tack surface as background within case.

O. Sign Type Family 22:
   1. IN-22.01: Extruded aluminum clip anodized black containing rollers to pinch and release paper. End caps are black plastic.
   2. IN-22.02: Patient Information holder constructed of 18 gauge formed sheet metal painted in specified color. Polished aluminum connecting rods and buttons. Button covers for mounting screws are to permanently attach and securely conceal screws.

2.5 FABRICATION

A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.

B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.

C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.

D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.

E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.

F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth su1rfaces.

G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.

H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.

I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints tightly mitered to give appearance of solid material.

J. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.

K. Movable parts, including hardware, are be cleaned and adjusted to operate as designed without binding of deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.

L. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

M. No signs are to be manufactured until final sign message schedule and location review has been completed by the Project Engineer & forwarded to contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Protect products against damage during field handling and installation. Protect adjacent existing and newly placed construction, landscaping and finishes as necessary to prevent damage during installation. Paint and touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface.

B. Mount signs in proper alignment, level and plumb according to the sign location plan and the dimensions given on elevation and sign location drawings. Where otherwise not dimensioned, signs shall be installed where best suited to provide a consistent appearance throughout the project. When exact position, angle, height or location is in doubt, contact Project Engineer for clarification.

C. Contractor shall be responsible for all signs that are damaged, lost or stolen while materials are on the job site and up until the completion and final acceptance of the job.

D. Remove or correct signs or installation work Project Engineer determines as unsafe or as an unsafe condition.

E. At completion of sign installation, clean exposed sign surfaces. Clean and repair any adjoining surfaces and landscaping that became soiled or damaged as a result of installation of signs.

F. Locate signs as shown on the Sign Location Plans.

G. Certain signs may be installed on glass. A blank glass back up is required to be placed on opposite side of glass exactly behind sign being installed. This blank glass back up is to be the same size as sign being installed.

H. Contractor will be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities will be the sole responsibility of the Contractor to correct and repair.

I. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices which may involve other trades.

- - - END - - -

SECTION 10 14 23
PHENOLIC SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Nonilluminated and illuminated signs as indicated in Drawings.

B. Related Sections include the following:

1. Section 26 50 00 - Wiring and other electrical work for illuminated signs.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide exterior signs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:
   a. Uniform pressure as indicated on Drawings.

B. Seismic Performance: Provide signs capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

C. Thermal Movements: Provide exterior signs that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for signs.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Wiring Diagrams: Power, signal, and control wiring for illuminated units.

C. Samples for Initial Selection: For units with phenolic panels:

1. Submit four samples, 3.5”x 3.5”, of each color and texture of panel material used.

D. Maintenance Data: For illuminated signs to include in maintenance manuals.

1. The use of abrasive cleaners or cleaning tools is prohibited on phenolic signs.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary panel products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

1. Products covered under the Work listed in this section are to be manufactured in an ISO 9001 certified facility.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify recessed openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating signs without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate installation of anchorage for signs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
    a. Structural failures of cabinets or frames.
    b. Faulty operation of hardware or illumination system.
    c. Deterioration of metals, metal finishes, and other materials beyond normal weathering. Verify available warranties for units and components and insert number below.

2. Warranty Period: Phenolic panels to be guaranteed against delamination for 10 years, and against discoloration for 10 years (Gray Scale 4 according to ISO 105A02-87).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
   1. Phenolic panel specifications are based on raw material panels manufactured by Trespa North America, Ltd., 800-487-3772.
      a. Represented locally by W.H. Steele Co., 909-930-0831. A list of approved fabricators that provide the system specified in this section as judged and approved by the architect may be acquired from the above.
2. Basis-of-Design Product: The design for each type of sign is based on the product named, subject to compliance with requirements. Products of other manufacturers satisfying the requirements of this specification shall be acceptable.

2.2 MATERIALS

A. Phenolic Panels: Trespa Meteon FR Panels, 3/8 inch thick, satin finish, color to be selected from Manufacturer's standard Meteon Metallic, Wood Grain, or Uni-color pallet.
   1. All panel-exposed edges shall be square cut, routed smooth, with an eased edge.
   2. Water Absorption: Less than 1.0% per EN 438-2 (7)
   3. Nonporous surface and edges
   4. Color Stability: Gray scale 4 – 5 according to ISO 105A02-87, (3000 hours Xenon test 1200)
   5. Flame spread (ASTM E84): Class 1A (5)
   6. Smoke Development (ASTM E84): maximum of 5
   7. Modulus of elasticity: 1,200,000-PSI minimum (8000 N/mm^2) minimum per DIN 53457
   8. Tensile strength: 13,000-PSI, minimum
   9. Flexural strength: 16,000-PSI minimum
   10. Surface Impact Resistance: 9 lb
   11. Scratch Resistance: 0.79 lbf (3.5 N) index minimum per EN 438-2 (14)

B. Finish Performance: Electron Beam Cure resin in conformance with the following general requirements:
   1. Color: As selected by the architect/engineer from manufacturer's standard colors or a custom color to be matched by the panel supplier.
   2. Humidity Resistance: No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100 degrees F (38 degrees C) for 3000 hours, ASTM D-2247.
   3. Salt Spray Resistance: Corrosion creepage from scribe line (1/16 inch (1.6 mm) max.) and minimum blister rating of 8 within the test specimen field, ASTM B117.

4. Weather Exposure: Accelerated - 3000 hours in Atlas Type Weatherometer using cycle of 90 minutes light and 30 minutes diminished light and demineralized water with a maximum color change of 5 Delta E units from the original color according to ASTM D2244, with the exception of Uni-Colors A12.3.7 / A18.3.5 / A04.1.7, which will not deviate more than 10 Delta E units from original color according ASTM D2244.
5. Color Stability: The decorative surface comply with, classification, 4 - 5 measured with the grey scale according to ISO 105 A02-93 according to test method EN 438-2:29.
6. Microbial Characteristics: Will not support micro-organic growth (ISO 846).

2.3 FABRICATION

A. Fabricate signs to requirements indicated for dimensions, design, and thickness and finish of materials. Use metals and shapes of thickness and reinforcing to produce flat surfaces, free of oil canning, and to impart strength for size, design, and application indicated.

B. Fabricate sign cabinets and door frames with reinforced corners, mitered and welded to a hairline fit, with no exposed fasteners. Provide structural reinforcement to prevent racking and misalignment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for electrical power system to verify actual locations of connections before installation of illuminated signs.

C. Examine walls and partitions for proper backing for signs.

D. Examine walls and partitions for suitable framing depth where recessed signs will be installed.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for signs as required by type and size of unit.

3.3 INSTALLATION

A. General: Install signs in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Recessed Signs: Attach signs to wall framing with fasteners at 16 inches o.c. Attach aluminum trim over edges of recessed signs and conceal grounds and clips.

C. Surface-Mounted Signs: Attach signs to wall surfaces with concealed clips, hangers, or grounds fastened at not less than 16 inches o.c. Secure both top and bottom of signs to walls.

D. Freestanding Signs: Install signs in locations indicated. Adjust floor glides so signs are level and plumb.

E. Comply with requirements in Division 26 Sections for connecting illuminated signs.

1. After installation is complete, install new lamps.

3.4 ADJUSTING AND CLEANING

A. Adjust sign doors to operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

B. Touch up factory-applied finishes to restore damaged or soiled areas.

- - - END - - -

SECTION 32 05 23
CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

~~SPEC WRITER NOTE: Delete or add information between // --- // and any other items applicable to project. Cover any item added to the text under Applicable Publications and Products and renumber the paragraphs. See Technical Notes at end of section.~~

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section shall cover site work concrete constructed upon the prepared subgrade and in conformance with the lines, grades, thickness, and cross sections shown on the Drawings. Construction shall include the following:

~~SPEC WRITER NOTE: Delete the items not required by the project or include any special items. See Technical Notes at end of this section.~~

~~B. // Curb, // gutter, // and combination curb and gutter // wheel stop //.~~

B~~C~~. Pedestrian Pavement: ~~// Walks // grade slabs //~~ Lawn mower strips ~~// pedestrian crossings // wheelchair curb ramps // terraces // steps // patios // healing gardens //.~~

~~D. Vehicular Pavement: // Service courts // driveways // parking lots // loading docks //.~~

C~~E~~. ~~Equipment Pads~~Sign bases~~; // Oxygen storage // transformers // propane tanks // generator pads //.~~Sign post footings; sign pedestals

~~SPEC WRITER NOTE: If Section CONCRETE is not a portion of specification, cover items cross referenced thereto within this section, and delete all references to Section 03 30 00, CAST-IN-PLACE CONCRETE throughout this section.~~

1.2 RELATED WORK

A. Section 00 72 00, GENERAL CONDITIONS~~.~~
B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
C. Section 01 45 29, TESTING LABORATORY SERVICES~~.~~
D. Section 03 30 53~~00~~, CAST-IN-PLACE CONCRETE (Short Form)~~.~~
E. Section 03 10 50, ROUND CONCRETE COLUMN FORMS
F~~E~~. Section 05 50 00, METAL FABRICATIONS
G. Section 09 06 00, SCHEDULE FOR FINISHES~~.~~
~~F. Section 31 20 00, EARTHWORK.~~

1.3 DESIGN REQUIREMENTS

Design all elements with the latest published version of applicable codes.

1.4 WEATHER LIMITATIONS

A. Hot Weather: Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and

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serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by ~~Resident~~Project Engineer.

B. Cold Weather: Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyantes or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by ~~Resident~~Project Engineer.

~~SPEC WRITER NOTE: If select subbase material is required due to unstable conditions or frost action, or as required by the geotechnical engineer, include the following. Also, edit all other applicable portions of this section.~~

~~**1.5 SELECT SUBBASE MATERIAL JOB MIX**~~

~~The Contractor shall retain a testing laboratory to design a select subbase material mixture and submit a job-mix formula to the Resident Engineer, in writing, for approval. The formula shall include the source of materials, gradation, plasticity index, liquid limit, and laboratory compaction curves indicating maximum density at optimum moisture. Cost of the testing laboratory to be included in the Contractor's cost of project.~~

1.6 SUBMITTALS

Contractor shall submit the following.

A. Manufacturers' Certificates and Data certifying that the following materials conform to the requirements specified.

~~1. Expansion joint filler~~

~~2. Hot poured sealing compound~~

1~~3~~. Reinforcement

2~~4~~. Curing materials

~~B. Jointing Plan for all concrete areas.~~

C. Concrete Mix Design~~.~~

D. Concrete Test Reports

E. Construction Staking Notes from Surveyor~~.~~

~~F. Data and Test Reports: Select subbase material.~~

~~1. Job-mix formula.~~

~~2. Source, gradation, liquid limit, plasticity index, percentage of wear, and other tests as specified and in referenced publications.~~

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~~SPEC WRITER NOTE: Update applicable publications to current issue at time of project specification preparation.~~

1.7 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Refer to the latest edition of all referenced Standards and codes.

A. American Association of State Highway and Transportation Officials (AASHTO):

~~M147-65-UL ..... Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses (R 2004)~~

M148-05-UL ..... Liquid Membrane-Forming Compounds for Curing Concrete (ASTM C309)

M171-05-UL ..... Sheet Materials for Curing Concrete (ASTM C171)

M182-05-UL ..... Burlap Cloth Made from Jute or Kenaf and Cotton Mats

B. American Society for Testing and Materials (ASTM):

A82/A82M-07 ..... Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

A185/185M-07..... Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

A615/A615M-12 ..... Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

A653/A653M-11 ..... Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process

A706/A706M-09b ..... Standard Specification for Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

A767/A767M-09 ..... Standard Specification for Zinc Coated (Galvanized) Steel Bars for Concrete Reinforcement

A775/A775M-07b ..... Standard Specification for Epoxy Coated Reinforcing Steel Bars

A820/A820M-11 ..... Standard Specification for Steel Fibers for Fiber Reinforced Concrete

C31/C31M-10..... Standard Practice for Making and Curing Concrete Test Specimens in the field

C33/C33M-11a..... Standard Specification for Concrete Aggregates

C39/C39M-12..... Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

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C94/C94M-12 ..... Standard Specification for Ready Mixed Concrete
C143/C143M-10a ..... Standard Test Method for Slump of Hydraulic Cement Concrete
C150/C150M-12 ..... Standard Specification for Portland Cement
C171-07 ..... Standard Specification for Sheet Materials for Curing Concrete
C172/C172M-10 ..... Standard Practice for Sampling Freshly Mixed Concrete
C173/C173M-10b ..... Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
C192/C192M-07 ..... Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
C231/C231M-10 ..... Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C260/C260M-10a ..... Standard Specification for Air Entraining Admixtures for Concrete
C309-11 ..... Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
C494/C494M-12 ..... Standard Specification for Chemical Admixtures for Concrete
C618-12 ..... Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
C666/C666M-03(2008) ..... Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
D1751-04(2008) ..... Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
D4263-83(2012) ..... Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
D4397-10 ..... Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

C. American Welding Society (AWS):
D1.4/D1.4M (2005) ..... Structural Welding Code - Reinforcing Steel

~~SPEC WRITER NOTE: Update materials to agree with requirements (type, grades, class, test method, tables, etc.) specified.~~

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PART 2 - PRODUCTS

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2.1 GENERAL

A. Concrete Type: Concrete shall be as per Table 1 – Concrete Type, air entrained.

TABLE I – CONCRETE TYPE

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	Concrete Strength		Non-Air-Entrained	Air-Entrained	
	Min. 28 Day Comp. Str. Psi (MPa)	Min. Cement lbs/c. yd (kg/m^3)	Max. Water Cement Ratio	Min. Cement lbs/c. yd (kg/m^3)	Max. Water Cement Ratio
Type A	5000 (35)[1,3]	630 (375)	0.45	650 (385)	0.40
Type B	4000 (30)[1,3]	550 (325)	0.55	570 (340)	0.50
Type C	3000 (25)[1,3]	470 (280)	0.65	490 (290)	0.55
Type D	3000 (25)[1,2]	500 (300)	*	520 (310)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 1200 psi (8.3 MPa) in excess of the compressed strength. For concrete strengths above 5000 psi (35 Mpa), the proposed mix design shall achieve a compressive strength 1400 psi (9.7 MPa) in excess of the compressed strength.
2. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
3. Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.

B. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

TABLE II – MAXIMUM SLUMP – INCHES (MM)

TYPE	MAXIMUM SLUMP*
~~Curb & Gutter~~	~~3 inches (75 mm)~~
~~Pedestrian Pavement~~	~~3 inches (75 mm)~~
~~Vehicular Pavement~~	~~2 inches (50 mm) (Machine Finished)~~ ~~4 inches (100 mm) (Hand Finished)~~
~~Equipment Pad~~Sign post footings or pedestals	3 to 4 inches (75 to 100 mm)
* For concrete to be vibrated: Slump as determined by ASTM C143. Tolerances as established by ASTM C94.	

2.2 REINFORCEMENT

A. The type, amount, and locations of steel reinforcement shall be as shown on the drawings and in the specifications.

~~SPEC WRITER NOTE: Check need for special subbase material and thickness required. If Subbase is selected delete the phrase (where required).~~

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~~**2.3 SELECT SUBBASE (WHERE REQUIRED)**~~

~~A. Subbase material shall consist of select granular material composed of sand, sand-gravel, crushed stone, crushed or granulated slag, with or without soil binder, or combinations of these materials conforming to AASHTO M147, as follows.~~

~~GRADE REQUIREMENTS FOR SOILS USED AS SUBBASE MATERIALS, BASE COURSES AND SURFACES COURSES~~

~~AASHTO M147~~		~~Percentage Passing by Mass~~					
~~Sieve~~	~~Size~~	~~Grades~~					
~~(mm)~~	~~(in)~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~	~~F~~
~~50~~	~~2~~	~~100~~	~~100~~				
~~25~~	~~1~~		~~75-95~~	~~100~~	~~100~~	~~100~~	~~100~~
~~9.5~~	~~3/8~~	~~30-65~~	~~40-75~~	~~50-85~~	~~60-100~~		
~~4.47~~	~~No. 4~~	~~25-55~~	~~30-60~~	~~35-65~~	~~50-85~~	~~55-100~~	~~70-100~~
~~2.00~~	~~No. 10~~	~~15-40~~	~~20-45~~	~~25-50~~	~~40-70~~	~~40-100~~	~~55-100~~
~~0.425~~	~~No. 40~~	~~8-20~~	~~15-30~~	~~15-30~~	~~25-45~~	~~20-50~~	~~30-70~~
~~0.075~~	~~No. 200~~	~~2-8~~	~~5-20~~	~~5-15~~	~~5-20~~	~~6-20~~	~~8-25~~

~~B. Materials meeting other gradations than that noted will be acceptable whenever the gradations are within a tolerance of three to five percent, plus or minus, of the single gradation established by the job-mix formula, or as recommended by the geotechnical engineer and approved by the Resident Engineer.~~

~~C. Subbase material shall produce a compacted, dense-graded course, meeting the density requirement specified herein.~~

2.~~3~~4 FORMS

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A. Use metal or wood forms that are straight and suitable in cross-section, depth, and strength to resist springing during depositing and consolidating the concrete, for the work involved.

B. Do not use forms if they vary from a straight line more than 1/8 inch (3 mm) in any ten foot (3000 mm) long section, in either a horizontal or vertical direction.

C. Wood forms should be at least 2 inches (50 mm) thick (nominal). Wood forms shall also be free from warp, twist, loose knots, splits, or other defects. Use approved flexible or curved forms for forming radii.

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2.~~4~~5 CONCRETE CURING MATERIALS

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A. Concrete curing materials shall conform to one of the following:

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1. Burlap having a weight of seven ounces (233 grams) or more per yard (square meter) when dry.
2. Impervious Sheeting conforming to ASTM C171.

~~SPEC WRITER NOTE: Choice below is Type 1 contains clear additive, and Type 2 contains white pigmented additive.~~

3. Liquid Membrane Curing Compound conforming to ASTM C309, ~~//~~ Type 1 ~~// Type 2 //~~ and shall be free of paraffin or petroleum.

2.5 COLORED CONCRETE

A. Exposed concrete surfaces designated to be colored shall have the coloring introduced into the concrete mix at the batch plant. Introduce sufficient quantities of carbon black or mineral oxide pigment to produce the color specified in Section 09 06 00, SCHEDULE FOR FINISHES.

1. Coloring materials affect shall not adversely affect air entrainment.

B. Prior to starting work, submit a sample of the colored concrete with type of coloring additive and the amount of additive per cubic yard (m^3) of concrete mix to the Project Engineer for approval.

~~**2.6 EXPANSION JOINT FILLERS**~~

~~Material shall conform to ASTM D1751-04.~~

PART 3 - EXECUTION

3.1 SUBGRADE PENETRATION

A. ~~Prepare, construct, and finish the subgrade as specified in Section 31 20 00, EARTHWORK.~~

~~B.~~ Maintain the subgrade in a smooth, compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

~~SPEC WRITER NOTE: Use Paragraph 3.2 only if SELECT SUBBASE is specified. If Subbase is selected delete the phrase (where required).~~

~~**3.2 SELECT SUBBASE (WHERE REQUIRED)**~~

~~A. Mixing: Proportion the select subbase by weight or by volume in quantities so that the final approved job-mixed formula gradation, liquid limit, and plasticity index requirements will be met after subbase course has been placed and compacted. Add water in approved quantities, measured by weight or volume, in such a manner to produce a uniform blend.~~

~~B. Placing:~~

~~1. Place the mixed material on the prepared subgrade in a uniform layer to the required contour and grades, and to a loose depth not to exceed 8 inches (200 mm), and that when compacted, will produce a layer of the designated thickness.~~

~~2. When the designated compacted thickness exceeds 6 inches (150 mm), place the material in layers of equal thickness. Remove unsatisfactory areas and replace with satisfactory mixture, or mix the material in the area.~~

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~~3. In no case will the addition of thin layers of material be added to the top layer in order to meet grade.~~

~~4. If the elevation of the top layer is 1/2 inch (13 mm) or more below the grade, excavate the top layer and replace with new material to a depth of at least 3 inches (75 mm) in compacted thickness.~~

~~C. Compaction:~~

~~1. Perform compaction with approved hand or mechanical equipment well suited to the material being compacted.~~

~~2. Moisten or aerate the material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.~~

~~3. Compact each layer to at least 95 percent or 100 percent of maximum density as specified in Section 31 20 00, EARTHWORK.~~

~~D. Smoothness Test and Thickness Control: Test the completed subbase for grade and cross section with a straight edge.~~

~~1. The surface of each layer shall not show any deviations in excess of 3/8 inch (10 mm).~~

~~2. The completed thickness shall be within 1/2 inch (13 mm) of the thickness as shown on the Drawings.~~

~~E. Protection:~~

~~1. Maintain the finished subbase in a smooth and compacted condition until the concrete has been placed.~~

~~2. When Contractor's subsequent operations or adverse weather disturbs the approved compacted subbase, excavate, and reconstruct it with new material meeting the requirements herein specified, at no additional cost to the Government.~~

3.2~~3~~ SETTING FORMS

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A. Base Support:

1. Compact the base material under the forms true to grade so that, when set, they will be uniformly supported for their entire length at the grade as shown.
2. Correct imperfections or variations in the base material grade by cutting or filling and compacting.

B. Form Setting:

1. Set forms sufficiently in advance of the placing of the concrete to permit the performance and approval of all operations required with and adjacent to the form lines.
2. Set forms to true line and grade and use stakes, clamps, spreaders, and braces to hold them rigidly in place so that the forms and joints are free from play or movement in any direction.

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3. Forms shall conform to line and grade with an allowable tolerance of 1/8 inch (3 mm) when checked with a straightedge and shall not deviate from true line by more than 1/4 inch (6 mm) at any point.
4. Do not remove forms until removal will not result in damaged concrete or at such time to facilitate finishing.
5. Clean and oil metal or wood forms each time they are used.
6. Make necessary corrections to forms immediately before placing concrete.
7. When any form has been disturbed or any subgrade or subbase has become unstable, reset and recheck the form before placing concrete.

~~SPEC WRITER NOTE: See TECHNICAL NOTES at end of this section for slipforming machine option.~~

C. The Contractor's Registered Professional Land Surveyor, specified in Section 00 72 00, GENERAL CONDITIONS, shall establish the control, alignment and the grade elevations of the forms or concrete slipforming machine operations. Staking notes shall be submitted for approval to the ~~Resident~~Project Engineer prior to placement of concrete. If discrepancies exist between the field conditions and the Drawings, Contractor shall notify ~~Resident~~Project Engineer immediately. No placement of concrete shall occur if a discrepancy greater than 1 inch (25 mm) is discovered.

3.~~3~~4 EQUIPMENT

A. The ~~Resident~~Project Engineer shall approve equipment and tools necessary for handling materials and performing all parts of the work prior to commencement of work.
B. Maintain equipment and tools in satisfactory working condition at all times.

3.~~4~~5 PLACING REINFORCEMENT

A. Reinforcement shall be free from dirt, oil, rust, scale or other substances that prevent the bonding of the concrete to the reinforcement. All reinforcement shall be supported for proper placement within the concrete section.
B. Before the concrete is placed, the ~~Resident~~Project Engineer shall approve the reinforcement placement, which shall be accurately and securely fastened in place with suitable supports and ties. The type, amount, and position of the reinforcement shall be as shown on the Drawings.

3.~~5~~6 PLACING CONCRETE - GENERAL

A. Obtain approval of the ~~Resident~~Project Engineer before placing concrete.
B. Remove debris and other foreign material from between the forms before placing concrete.
C. Before the concrete is placed, uniformly moisten the subgrade, base, or subbase appropriately, avoiding puddles of water.
D. Convey concrete from mixer to final place of deposit by a method which will prevent segregation or loss of ingredients. Deposit concrete so that it requires as little handling as possible.

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E. While being placed, spade or vibrate and compact the concrete with suitable tools to prevent the formation of voids or honeycomb pockets. Vibrate concrete well against forms and along joints. Over-vibration or manipulation causing segregation will not be permitted. Place concrete continuously between joints without bulkheads.

F. Install a construction joint whenever the placing of concrete is suspended for more than 30 minutes and at the end of each day's work.

G. Workmen or construction equipment coated with foreign material shall not be permitted to walk or operate in the concrete during placement and finishing operations.

H. Cracked or Chipped Concrete Surfaces and Bird Baths. Cracked or chipped concrete and bird baths will not be allowed. Concrete with cracks or chips and bird baths will be removed and replaced to the nearest joints, and as approved by the ~~Resident~~Project Engineer, by the Contractor with no additional cost to the Government.

3.6~~7~~ PLACING CONCRETE FOR ~~CURB AND GUTTER, PEDESTRIAN PAVEMENT~~MOWSTRIPS AND~~, AND EQUIPMENT PADS~~SIGN BASES

A. Place concrete in the forms in one layer of such thickness that, when compacted and finished, it will conform to the cross section as shown.

B. Deposit concrete as near to joints as possible without disturbing them but do not dump onto a joint assembly.

C. After the concrete has been placed in the forms, use a strike-off guided by the side forms to bring the surface to the proper section to be compacted.

D. Consolidate the concrete thoroughly by tamping and spading, or with approved mechanical finishing equipment.

E. Finish the surface to grade with a wood or metal float.

F. All Concrete pads and pavements shall be constructed with sufficient slope to drain properly.

~~**3.8 PLACING CONCRETE FOR VEHICULAR PAVEMENT**~~

~~A. Deposit concrete into the forms as close as possible to its final position.~~

~~B. Place concrete rapidly and continuously between construction joints.~~

~~C. Strike off concrete and thoroughly consolidate by a finishing machine, vibrating screed, or by hand-finishing.~~

~~D. Finish the surface to the elevation and crown as shown.~~

~~E. Deposit concrete as near the joints as possible without disturbing them but do not dump onto a joint assembly. Do not place adjacent lanes without approval by the Resident Engineer.~~

3.7~~9~~ CONCRETE FINISHING - GENERAL

A. The sequence of operations, unless otherwise indicated, shall be as follows:

1. Consolidating, floating, straight-edging, troweling, texturing, and edging of joints.
2. Maintain finishing equipment and tools in a clean and approved condition.

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~~3.10 CONCRETE FINISHING CURB AND GUTTER~~

~~A. Round the edges of the gutter and top of the curb with an edging tool to a radius of 1/4 inch (6 mm) or as otherwise detailed.~~

~~B. Float the surfaces and finish with a smooth wood or metal float until true to grade and section and uniform in textures.~~

~~C. Finish the surfaces, while still wet, with a bristle type brush with longitudinal strokes.~~

~~D. Immediately after removing the front curb form, rub the face of the curb with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Brush the surface, while still wet, in the same manner as the gutter and curb top.~~

~~E. Except at grade changes or curves, finished surfaces shall not vary more than 1/8 inch (3 mm) for gutter and 1/4 (6 mm) for top and face of curb, when tested with a 10 foot (3000 mm) straightedge.~~

~~F. Remove and reconstruct irregularities exceeding the above for the full length between regularly scheduled joints.~~

~~G. Correct any depressions which will not drain. See Article 3.6, Paragraph H, above.~~

~~H. Visible surfaces and edges of finished curb, gutter, and/or combination curb and gutter shall be free of blemishes, form marks, and tool marks, and shall be uniform in color, shape, and appearance.~~

3.~~8~~11 CONCRETE FINISHING ~~PEDESTRIAN PAVEMENT~~MOWSTRIPS

A. ~~/Mo/ Walks, // Grade Slabs, // Lawn Mower Crossings, // Wheelchair Curb Ramps, // Terraces, // Healing Gardens //:~~ wstrips:

1. Finish the surfaces to grade and cross section with a metal float, troweled smooth and finished with a broom moistened with clear water.
2. Brooming shall be transverse to the line of traffic.
3. Finish all slab edges, including those at formed joints, carefully with an edger having a radius as shown on the Drawings.
4. Unless otherwise indicated, edge the transverse joints before brooming. The brooming shall eliminate the flat surface left by the surface face of the edger. Execute the brooming so that the corrugation, thus produced, will be uniform in appearance and not more than 1/16 inch (2 mm) in depth.
5. The completed surface shall be uniform in color and free of surface blemishes, form marks, and tool marks. The finished surface of the pavement shall not vary more than 3/16 inch (5 mm) when tested with a 10 foot (3000 mm) straightedge.
6. The thickness of the pavement shall not vary more than 1/4 inch (6 mm).
7. Remove and reconstruct irregularities exceeding the above for the full length between regularly scheduled joints at no additional cost to the Government.

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~~SPEC WRITER NOTE: Site steps are those exterior steps not attached to a building or structure. Edit subparagraph to include metal components (nosing and railing), when required.~~

~~B. Steps: The method of finishing the steps and the sidewalls is similar to above except as herein noted.~~

~~1. Remove the riser forms one at a time, starting with the top riser.~~

~~2. After removing the riser form, rub the face of the riser with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Use an outside edger to round the corner of the tread; use an inside edger to finish the corner at the bottom of the riser.~~

~~3. Give the risers and sidewall a final brush finish. The treads shall have a final finish with a stiff brush to provide a non-slip surface.~~

~~4. The texture of the completed steps shall present a neat and uniform appearance and shall not deviate from a straightedge test more than 3/16 inch (5 mm).~~

~~3.12 CONCRETE FINISHING FOR VEHICULAR PAVEMENT~~

~~A. Accomplish longitudinal floating with a longitudinal float not less than 10 feet (3000 mm) long and 6 inches (150 mm) wide, properly stiffened to prevent flexing and warping. Operate the float from foot bridges in a sawing motion parallel to the direction in which the pavement is being laid from one side of the pavement to the other, and advancing not more than half the length of the float.~~

~~B. After the longitudinal floating is completed, but while the concrete is still plastic, eliminate minor irregularities in the pavement surfaces by means of metal floats, 5 feet (1500 mm) in length, and straightedges, 10 feet (3000 mm) in length. Make the final finish with the straightedges, which shall be used to float the entire pavement surface.~~

~~C. Test the surface for trueness with a 10 foot (3000 mm) straightedge held in successive positions parallel and at right angles to the direction in which the pavement is being laid and the entire area covered as necessary to detect variations. Advance the straightedge along the pavement in successive stages of not more than one half the length of the straightedge. Correct all irregularities and refinish the surface.~~

~~D. The finished surface of the pavement shall not vary more than 1/4 inch (6 mm) in both longitudinal and transverse directions when tested with a 10 foot (3000 mm) straightedge.~~

~~E. The thickness of the pavement shall not vary more than 1/4 inch (6 mm).~~

~~F. When most of the water glaze or sheen has disappeared and before the concrete becomes nonplastic, give the surface of the pavement a broomed finish with an approved fiber broom not less than 18 inches (450 mm) wide. Pull the broom gently over the surface of the pavement from edge to edge. Brooming shall be transverse to the line of traffic and so executed that the corrugations thus produced will be uniform in character and width, and not more than 1/8 inch (3~~

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~~mm) in depth. Carefully finish the edge of the pavement along forms and at the joints with an edging tool. The brooming shall eliminate the flat surface left by the surface face of the edger.~~

~~C. The finish surfaces of new and existing abutting pavements shall be flush and in alignment at their juncture.~~

3.~~913~~ CONCRETE FINISHING ~~EQUIPMENT PADS~~SIGN BASES

A. After the surface has been struck off and screeded to the proper elevation, provide a smooth dense float finish, free from depressions or irregularities.

B. Carefully finish all slab edges with an edger having a radius as shown in the Drawings.

C. After removing the forms, rub the faces of the pad with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The finish surface of the pad shall not vary more than 1/8 inch (3 mm) when tested with a 10 foot (3000 mm) straightedge.

D. Correct irregularities exceeding the above. See Article 3.6, Paragraph H, above.

~~SPEC WRITER NOTE: Delete portions of following which do not apply to project. Edit joint requirements for pedestrian vehicular pavement, and curb and gutter.~~

~~**3.14 JOINTS - GENERAL**~~

~~A. Place joints, where shown on the Shop Drawings and Drawings, conforming to the details as shown, and perpendicular to the finished grade of the concrete surface.~~

~~B. Joints shall be straight and continuous from edge to edge of the pavement.~~

~~**3.15 CONTRACTION JOINTS**~~

~~A. Cut joints to depth as shown with a grooving tool or jointer of a radius as shown or by sawing with a blade producing the required width and depth.~~

~~B. Construct joints in curbs and gutters by inserting 1/8 inch (3 mm) steel plates conforming to the cross sections of the curb and gutter.~~

~~C. Plates shall remain in place until concrete has set sufficiently to hold its shape and shall then be removed.~~

~~D. Finish edges of all joints with an edging tool having the radius as shown.~~

~~E. Score pedestrian pavement with a standard grooving tool or jointer.~~

~~**3.16 EXPANSION JOINTS**~~

~~A. Use a preformed expansion joint filler material of the thickness as shown to form expansion joints.~~

~~B. Material shall extend the full depth of concrete, cut and shaped to the cross section as shown, except that top edges of joint filler shall be below the finished concrete surface where shown to allow for sealing.~~

~~C. Anchor with approved devices to prevent displacing during placing and finishing operations.~~

~~D. Round the edges of joints with an edging tool.~~

~~E. Form expansion joints as follows:~~

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~~1. Without dowels, about structures and features that project through, into, or against any site work concrete construction.~~

~~2. Using joint filler of the type, thickness, and width as shown.~~

~~3. Installed in such a manner as to form a complete, uniform separation between the structure and the site work concrete item.~~

~~3.17 CONSTRUCTION JOINTS~~

~~A. Locate // longitudinal // and transverse // construction joints between slabs of vehicular pavement as shown on the Shop Drawing jointing plan and Drawings.~~

~~B. Place transverse construction joints of the type shown, where indicated and whenever the placing of concrete is suspended for more than 30 minutes.~~

~~C. Use a butt-type joint with dowels in // curb and gutter // if the joint occurs at the location of a planned joint.~~

~~D. Use keyed joints with tiebars if the joint occurs in the middle third of the normal // curb and // gutter joint interval.~~

3.1~~0~~8 FORM REMOVAL

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A. Forms shall remain in place at least 12 hours after the concrete has been placed. Remove forms without injuring the concrete.

B. Do not use bars or heavy tools against the concrete in removing the forms. Promptly repair any concrete found defective after form removal.

C. Remove paper tube forms as soon as practical without damage to concrete.

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3.11~~2~~0 CURING OF CONCRETE

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A. Cure concrete by one of the following methods appropriate to the weather conditions and local construction practices, against loss of moisture, and rapid temperature changes for at least seven days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready to install before actual concrete placement begins. Provide protection as necessary to prevent cracking of the pavement due to temperature changes during the curing period. If any selected method of curing does not afford the proper curing and protection against concrete cracking, remove and replace the damaged pavement and employ another method of curing as directed by the ~~Resident~~Project Engineer.

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B. Burlap Mat: Provide a minimum of two layers kept saturated with water for the curing period. Mats shall overlap each other at least 150 mm (6 inches).

C. Impervious Sheeting: Use waterproof paper, polyethylene-coated burlap, or polyethylene sheeting. Polyethylene shall be at least 0.1 mm ~~4 mils~~ (4 mils~~0.1 mm~~) in thickness. Wet the entire exposed concrete surface with a fine spray of water and then cover with the sheeting material. Sheets shall overlap each other at least 300 mm ~~12 inches~~ (12 inches~~300 mm~~). Securely anchor sheeting.

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D. Liquid Membrane Curing:

1. Apply pigmented membrane-forming curing compound in two coats at right angles to each other at a rate of 5 m^2/L ~~200 square feet per gallon~~ (200 square feet per gallon~~5 m^2/L~~) for both coats.
2. Do not allow the concrete to dry before the application of the membrane.
3. Cure joints designated to be sealed by inserting moistened paper or fiber rope or covering with waterproof paper prior to application of the curing compound, in a manner to prevent the curing compound entering the joint.
4. Immediately re-spray any area covered with curing compound and damaged during the curing period.

3.12~~21~~ CLEANING

A. After completion of the curing period:

1. Remove the curing material (other than liquid membrane).
2. Sweep the concrete clean.
3. ~~After removal of all foreign matter from the joints, seal joints as specified.~~
4. ~~Clean the entire concrete of all debris and construction equipment as soon as curing and sealing of joints has been completed.~~

3.13~~22~~ PROTECTION

The contractor shall protect the concrete against all damage prior to final acceptance by the Government. Remove concrete containing excessive cracking, fractures, spalling, or other defects and reconstruct the entire section between regularly scheduled joints, when directed by the ~~Resident~~Project Engineer, and at no additional cost to the Government. Exclude traffic from vehicular pavement until the concrete is at least seven days old, or for a longer period of time if so directed by the ~~Resident~~Project Engineer.

3.14~~23~~ FINAL CLEAN-UP

Remove all debris, rubbish and excess material from the ~~Station~~Medical Center.

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~~SPEC WRITER NOTES:~~
~~(These Technical Notes are intended as a guide in preparing this specification section and the detail drawings. Delete these notes before typing the Contract Specifications. Modify this specification section and appropriate details and finishes included on the drawings for site work concrete, such as, other methods of construction (when aesthetics is of prime importance), or special game areas (shuffleboard, horseshoe, game tables, etc.). If any of the following items are used,~~

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~~include the referenced publication and paragraphs in the appropriate portion of the contract specification.)~~
~~A. When the project is located in an area where winter damage from deicing chemicals and freeze-thaw cycles pose a serious problem, the Spec Writer shall check the need for a special protective coating of linseed oil mixture. The coating protects only against the action of urea, sodium chloride, and calcium chloride used for deicing purposes. Protection against these chemicals is not required for concrete that will be in place for a cumulative time of six weeks at a continuous minimum temperature of 5 °C (40 °F), excluding the curing time. Otherwise, give concrete protective coating. Referenced paragraphs:~~
~~APPLICABLE PUBLICATION: AASHTO M233, Boiled Linseed Oil Mixture for Treatment of Portland Cement Concrete.~~
~~MATERIALS: Concrete Protection Material-Linseed Oil mixture shall conform to AASHTO M233.~~
~~CURING AND PROTECTION: Protective Coating - apply protective coating of linseed oil mixture to exposed-to-view concrete surfaces, drainage structures, and features that project through, into, or against the items constructed under this section to protect the concrete against the action of deicing materials.~~
~~1. Application: Complete backfilling and curing operation prior to applying protective coating. Concrete shall be surface dry and thoroughly clean before each application. Give the concrete surface at least two applications. Coverage shall not be more than 11 m2/L (50 square yards per gallon) for first application, and not more than 16 m2/L (70 square yards per gallon) for the second application, except when the number of applications and coverage for each application for commercially prepared mixture shall be in accordance with the manufacturer's instructions. Protect coated surfaces from vehicular and pedestrian traffic until dry.~~
~~2. Precautions: Do not heat protective coating, and do not expose the protective coating to open flame, sparks, or fire adjacent to open containers or applicators. Do not apply material at temperatures lower than 50 deg F (10 deg C).~~
~~SUBMITTALS: Certificates-Concrete Protective Coating.~~
~~B. In some case it may be practical and economical to build concrete vehicular pavement with an integral curb section. The integral curb being constructed simultaneously with the pavement slab in a one-step operation avoids a longitudinal joint between the curb and gutter, and pavement. The curb is easily formed with a template and straightedge. The only joints generally required in the integral curbs are continuations of the transverse joints in the pavement slab. Another option for concrete curb or curb and gutter not required to be constructed integral with or tied to a concrete pavement,~~

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~~is the use of a self-propelled machine (slipforming machine) to place the concrete. This type of construction is most advantageous when the drawing details indicate a "mountable" (rolled) type curb and gutter. However, use of these machines on small jobs is generally not cost justifiable. Include the following paragraph and additional requirements for the integral curb template, extrusion equipment, and self-propelled machine in the appropriate portions of the Contract Specification, when an integral curb is indicated on the drawings or the use of a curb-forming machine is justified.~~

~~CURB-FORMING MACHINES: Curb-forming machines for constructing // integral curbs // curbs // and gutter // will be approved based on trail use on the job. If the equipment produces unsatisfactory results, discontinue use of the equipment at any time during construction and accomplish the work by hand method construction as specified. Remove unsatisfactory work and reconstruct the full length between regularly scheduled joints. Dispose of removed portions off the Station.~~

~~C. When aesthetics is of prime importance and certain areas are shown to have a special finish and texture, such as an exposed aggregate surface or to have colored concrete, the Spec Writer shall consider the use of the following data:~~

~~1. Contact the Portland Cement Association district office in the area of the project for advice in specifying and detailing the finish and texture desired.~~

~~2. Exposed Aggregate Concrete: For use by the physically handicapped, the texture of an exposed aggregate surface shall be smooth and the aggregate size shall not produce a rough finish. There are a number of ways to obtain exposed aggregate finishes, so base the method selected on local materials and construction practices. The following is a suggested paragraph:~~

~~EXPOSED AGGREGATE CONCRETE: When concrete is shown to have an exposed aggregate surface, the finish shall be as follows: Apply mix and mark off surface as indicated with surface joints at least 3/8 inch (10 mm) deep. Level off finish to a true surface and compact with a wood float, working as little as possible so that coarse material will remain at the top. Before finish has set, treat top surface with cement retarding material. When body of concrete finish has set, remove retarded surface film by wire brushes and fine water spray to remove the mortar from the top of the colored aggregate. Continue washing and brushing until flush water runs clear and there is no noticeable cement film left on the aggregate. Specify color of aggregate in Section 09 06 00, SCHEDULE FOR FINISHES. Prior to starting work, submit a sample of exposed aggregate concrete panel to the Resident Engineer for approval.~~

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~~Edit the above paragraph to describe the "seeding method" of preparing a concrete base 3/8 to 1/2 inch (10 to 13 mm) lower than the finish grade to accommodate the aggregate to be scattered over the concrete base surface and embedded therein by use of a hand float, straight edge, or darby. After the aggregate is embedded, the usual procedures are followed to expose the aggregate.~~

~~D. Colored Concrete - Two method of producing colored concrete finishes are: By integral color or by the dry-shake method. For durability, uniformity of color and lower cost, the Department of Veterans Affairs preference is the integral color method. The amount of pigment used to achieve integral colored concrete should be the minimum amount necessary to produce the desired color, but never more than 10 percent by weight of the cement. The use of white Portland cement produces cleaner, brighter colors and is the preference to normal gray Portland cement, except for black or dark gray colors. The following is a suggested paragraph: COLORED CONCRETE: Pedestrian pavement designed to be colored shall have the coloring introduced into the concrete mix at the batch plant. Introduce sufficient quantities of // carbon black // mineral oxide pigment // to produce the color specified in Section 09 06 00, SCHEDULE FOR FINISHES. Prior to starting work, submit a sample of the colored concrete with type of coloring additive and the amount of additive per cubic yard (m3) of concrete mix to the Resident Engineer for approval.~~

~~Some coloring materials affect air entrainment while others do not, the Spec Writer will make certain that the color and mixtures used do not produce a concrete having less than the desired air content specified. Edit the above paragraph and drawing details as required to cover mixing, placing, preparation, equipment, finish, and any special construction.~~

~~E. Include under the SUBMITTALS portion of Contract Specifications the following paragraphs(s) as applicable:~~

~~Samples:~~

~~1. Exposed aggregate concrete panel, 4 square feet by 2 inches (0.4 m2 by 50 mm) thick, 2 required, each color and finish.~~

~~2. Color concrete panel, as specified in Section 09 06 00, SCHEDULE FOR FINISHES, with mix data.~~

~~3. Snow Melting Systems - Specify snow melting systems as required by the HVAC design manual in a separate section and that section title referenced in this section. The site plan drawings shall indicate the areas to be provided with the snow melting systems.~~

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